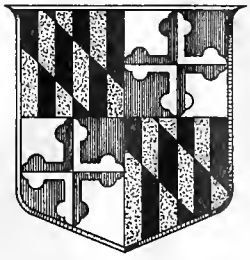
THE
IRON AND STEEL INDUSTRY
BLAST FURNACES, STEEL WORKS AND ROLLING MILLS



·MARYLAND·
·STATE·PLANNING·COMMISSION·

NOVEMBER 1938

PUBLICATION № 19

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MARYLAND STATE PLANNING COMMISSION

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REPORT ON

THE IRON AND STEEL INDUSTRY OF MARYLAND

- - - -

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS

by

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Consultant

Assistance in the preparation of these materials was furnished by
the personnel of Works Progress Administration
Work Projects Nos. 7050 and 7068

November, 1938

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INTRODUCTORY STATEMENT

The Maryland State Planning Commission presents herewith a report on the Blast Furnace, Steel Works, and Rolling Mill Industry of Maryland, the most significant component of the entire Iron and Steel Industry. This is the third of a series of reports on the vital industries of Maryland. The two previous reports covered the Men's Clothing Industry and the Fertilizer Industry.

These reports contain essential basic information for a more comprehensive analysis of the State's economy as a whole. This broader study is now underway and a series of reports thereon, beginning with the construction of a base pattern of the State's economy, is contemplated for the near future. Following the development of this base pattern, it is proposed to issue a report on the trends to date of the predominant factors in this pattern. It is planned to reduce the mechanics of observing these trends to such a state of simplicity that it will be possible to maintain them currently. Deviations of such factors from national trends will suggest further analyses of the causes and probable effects thereof. In this way a continuing picture of the State's economy should be currently available for guidance in future planning.

Through the cooperation of the National Resources Committee, Mr. A. A. Imberman was made available to inaugurate the study covered by this report. Following the retirement of Mr. Imberman in this enterprise, Mr. Harry A. Brice was assigned to complete the study and to prepare a report thereon.

With the Iron and Steel Industry surpassed only by the Building Industry in providing employment in the State and accounting for nearly six percent

of industrial employment, a knowledge of its past experience and prospects is manifestly important to the people of Maryland. When such a great employment factor resides almost entirely in a single plant and one of several operated by a single corporation, the importance of such information is considerably increased. This accounts for the selection of this field for special study by the Maryland State Planning Commission and the emphasis therein on the Sparrows Point Plant of the Bethlehem Steel Corporation.

It is gratifying to learn from the report that this plant is one of the big ten in the United States and appears to be in a highly favorable competitive position. Strong corporate backing, a fully integrated operation, strategic location on tidewater, favorable material costs, and modern equipment for the manufacture of its predominant products for which there is an expanding demand, give promise of this plant continuing to make a substantial contribution to the State's economy.

The report shows that the Iron and Steel Industry of Maryland weathered the depression somewhat better than the national industry as a whole and despite technological changes, is under normal operations a greater employer of men than ever before.

The present position appears to have some advantage over the national average and the prospects for maintaining and extending this stability are currently favorable. It should be realized, however, that unforseen developments may alter this picture at any time.

Abel Wolman

Abel Wolman, Chairman
Maryland State Planning Commission

ACKNOWLEDGMENT

Grateful acknowledgment is made to all those who have contributed through published and private data to make this study and report possible.

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CHAPTER 1

THE INDUSTRY AND ITS CHANGING SIGNIFICANCE TO THE ECONOMY OF THE STATE

CHAPTER 1

THE INDUSTRY AND ITS CHANGING SIGNIFICANCE TO THE ECONOMY OF THE STATE

The manufacture of charcoal iron and the hand forging of this iron into billets and iron products was started in the vicinity of the present site of Baltimore in Colonial days many years before the development of the manufacture of pig iron with coke fuel and the art of making steel from pig iron.

Local natural resources of iron ore, limestone and of wood for the manufacture of charcoal fuel, were available adjacent to the Patapsco River. Most of the iron produced in Colonial days was exported to England and Scotland and the transportation of iron from inland points was a very difficult problem at that time.

Maryland's favorable position with respect to raw materials and shipping facilities enabled her to assume a leading position in the production of iron early in this period.

Maryland's importance as an iron producing state started to decline as the industry grew more rapidly in eastern Pennsylvania and western New Jersey. With the settlement and growth of the country farther west, new developments followed which created increased demand for iron and stimulated the development of new and improved methods of producing it. One of the most important of these developments was the advent of railroads which created a new and large demand for iron in rails and other track equipment and in rolling stock. The railroads also provided better facilities for transporting raw materials to iron manufacturing centers and for wider distribution of iron products.

The opening of large iron ore deposits in the Lake Superior Region and of bituminous coal mines in western Pennsylvania, the development of large blast furnaces using coke as fuel and making pig iron, and the advent of the art of making steel from pig iron, resulted in reduced costs of producing iron and steel which further stimulated the use of iron and steel in the construction of railroads and railroad equipment, buildings, bridges, machinery, pipe and industrial equipment.

Due to lower costs of raw materials and more modern manufacturing facilities the subsequent growth of the iron and steel industry and facilities for fabricating iron and steel into finished products was greatest in Pennsylvania, Ohio, Illinois, Indiana and Alabama.

Towards the end of the 19th century these developments resulted in prices of iron and steel with which Maryland producers with less favorable raw material supplies and less modern equipment were unable to compete and the industry became practically extinct in Maryland.

A revival of Maryland's iron and steel industry was started in 1887 when the Maryland Steel Company selected Sparrows Point, Maryland, as a location for a blast furnace plant and began the erection of four blast furnaces. This plant located on tidewater, was originally intended only for the production of pig iron from ores imported from foreign countries. New developments in steel making and rolling resulted in expansion of the plant to include facilities for making Bessemer and Open Hearth steel ingots and the rolling of these into steel products.

In addition to the Maryland Steel Company plant, three other steel plants were established in Maryland. These were the Baltimore and Ohio Railroad Company plant at Cumberland which is now reduced, by abandonment, to a

scrap reclamation plant making bars and rods, the N. G. Taylor Company plant at Cumberland, a comparatively small non-integrated operation confined to rolling of sheet steels, and the Eastern Rolling Mill Company, at Colgate, another non-integrated operation confined to rolling operations only.

While these plants revived the iron and steel industry of Maryland their production did not bring Maryland back to a position of material importance in the Nation's iron and steel industry.

The Maryland Steel Company, Sparrows Point Plant and the Baltimore Sheet and Tin Plate Company were acquired by the Bethlehem Steel Corporation in 1916.

The Bethlehem Steel Corporation, recognizing the potentialities of the Sparrows Point plant has followed a policy of expansion and modernization of this plant to particularly equip it for the production of such products as plates, sheets, tin plate, wire rods and wire products, and other products for which there has been the greatest expansion in demand.

In a recent expansion and modernization program the Bethlehem Steel Corporation appropriated a very large sum to the Sparrows Point plant for the installation of a modern hot strip mill and other steel rolling improvements which have equipped the plant for meeting the growing demand for better quality steel products at lower prices.

The Sparrows Point plant is the predominant part of Maryland's blast furnace, steel works, and rolling mill industry. It is strategically located with respect to assembly of raw materials and distribution of products which are vital factors in the industry due to the large bulk of materials required. Due to its location on tidewater a large part of the raw materials are transported to the plant by water and a considerable seaboard market can be reached by low cost water transportation of products.

Through the parent company's large holdings of coal, ore and limestone properties, the Sparrows Point plant is assured of raw material supplies for many years at costs comparing favorably with those of other steel producing areas.

Maryland is fortunate in having as its predominant blast furnace, steel and rolling mill plant, a fully integrated plant equipped with the most modern facilities for the production of its predominant products which products are among those for which the demand is more stable and is increasing due to the growth of miscellaneous uses of steel in many lines of consumers goods.

The Bethlehem Steel Corporation is the second largest iron and steel producer in the United States, being outranked only by the United States Steel Corporation. It owns or controls through leases, large reserves of its raw materials in the United States, Cuba and Chile, and transportation facilities for the movement of ores to the Sparrows Point plant and for water distribution of products. It has maintained a very favorable attitude toward the Maryland plant as evidenced by progressive expansion and modernization of that plant until it has become one of the most important units of its operations.

Examination of the financial reports of the various steel companies clearly indicates the relative financial strength of the Bethlehem Steel Corporation in the corporate group of large producers.

The table on page 17 shows; "A", the relation of the Sparrows Point plant capacity to the total United States capacity; and "B", the relation of the Sparrows Point plant capacity to the total capacity of all Bethlehem Steel Corporation plants for products made at the Sparrows Point plant. It

also shows the rank of the Sparrows Point plant with respect to the United States capacity on these products.

This table was prepared from data on annual capacities reported in the 1935 Iron and Steel Directory.

Examination of this table discloses that on seven products the Corporation's entire capacity for production of these products is in the Sparrows Point plant and that on five other products, over fifty percent of the Corporation's capacity for production is located at Sparrows Point. This shows the strong position of the Sparrows Point plant in the operations of the Bethlehem Steel Corporation.

This position was further strengthened since 1935 by the addition of a hot rolled strip steel mill of 600,000 tons annual capacity, with its finishing end for strip sheets and plates, and a cold rolling unit having an annual capacity of 150,000 tons for the manufacture of sheets and tin plate.

An industry of the magnitude of the Bethlehem Steel Corporation operation at Sparrows Point has considerable influence on employment and wages in the Baltimore area and the State. While there have been periodic fluctuations in production, employment and wages in this industry in sympathy with varying demand for iron and steel products, the long time trend has been upward.

The National and Maryland trends in employment and wages, 1929-1938 inclusive are shown in the graphs and tabulations of Exhibits 10 and 11 on pages 62 and 65. An examination of these exhibits discloses a better cyclical performance of Maryland's iron and steel industry than for the Nation. Employment and wages in Maryland held above the National throughout

the period, did not go as low in the lowest year, 1932, recovered more rapidly and to a higher level following the low year, and showed a better average in both employment and wages for the period. This was contributive to greater stability of employment and wages in Baltimore and the State.

In recent years there has been a definite trend towards improvement in the quality of steel and a reduction in price which has stimulated the use of steel in older products and extended its use in many new products.

This has been accomplished through improvements in rolling equipment and practices, annealing, heat treating and the use of alloying metals to give special physical properties to steel.

Some of these improvements, particularly those in rolling equipment and practices, have resulted in reductions in the amount of labor employed in rolling operations. Such reductions have been counterbalanced however, by increased demand and production of steel with a resultant increase in employment and wages. During the 1936-1937 recovery in steel operations, employment in the industry reached an all time peak.

The combination of the strong Bethlehem Steel Corporation backing, a fully integrated operation from raw materials to finished products, favorable raw material costs and facilities for products distribution, most modernly equipped rolling mills specially adapted to low cost production of its predominant products and the expanding demand for such products, gives promise of the Sparrows Point plant, Maryland's predominant iron and steel producer, continuing to make a substantial contribution to the State's economy in employment and wages.

CHAPTER 3

HISTORY OF THE IRON AND STEEL INDUSTRY OF MARYLAND

CHAPTER 2

HISTORY OF THE IRON AND STEEL INDUSTRY OF MARYLAND[1]

The iron and steel industry of Maryland had its beginning early in the eighteenth century when the existence of oxidized iron ores adapted to simple smelting practices were discovered along the Patapsco River in the vicinity of Baltimore and in Cecil County.

Probably the earliest smelting of iron ore in Maryland was started by the Principio Company's erection of a furnace in Cecil County. The second furnace of record was erected on John Moale's land at the mouth of Gwynns Falls in 1725.

In 1754 there were seven furnaces and eight forges in operation and by 1758 this had increased to eight furnaces and ten forges producing about 2,500 tons of pig iron and 600 tons of bar iron annually.

During the period of 1750 to 1755, prior to the Revolution, the production was small ranging between 1,500 and 3,000 tons of pig iron and 518 to 640 tons of bar iron annually. Most of this was exported to England and Scotland.

By the time of the Revolution, seventeen furnaces had been erected of which all but four were in operation. Seventeen forges were also in operation. Most of the iron made during the Revolutionary War period was used in making cannons and cannon balls for the American Armies.

The early furnaces were crude shafts usually constructed of native stone. The forges were of similar construction. Blast for furnaces and forges was supplied by crude bellows operated by water wheels. Charcoal was used exclusively as reducing fuel.

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(1) "The Iron Ores of Maryland, With an Account of The Iron Industry," by Joseph T. Singerwalter, Maryland State Geological Survey, 1909.

During the Colonial Period, the most important ore supply was the carbonate ores of the Arundel Formation from mines along the Patapsco River. In 1760 ores from further west in the State began to be used by the starting of a furnace using Limonite Ore in Frederick County followed by three other operations in Washington County and one in Carroll County. The last furnace erected during this period was by Catoctin Creek in Frederick County.

Some of the ores, mined in Maryland during the Colonial Period, were transported to Virginia for smelting.

After the Revolution, during the period from 1780 to 1830 the industry made little progress in Maryland. Only seven new furnaces were erected and six of the old furnaces were abandoned. The production of pig iron reached 5,000 tons for the year 1810 but fell to 3,165 tons for 1830.

The period from 1830 to 1885 was an important period in the early development of the industry in Maryland as in the first half of it a marked era of furnace and forge building began which lasted until 1855. This was followed by a stationary period of about 10 years and in 1865 a rapid decline started in furnace and forge building and many of the unfavorable operations were closed down. Production held up, from the remaining operations, for a time but declined rapidly toward the latter part of the period and most of the operations in the Baltimore area were closed down.

The great activity during the first half of this period was due to extensive building of railroads and railroad equipment which caused a great demand for iron and boosted the price of pig iron to as high as $75.00 per ton. The cost of manufacturing was estimated at $24.00 per ton leaving a handsome profit. The period was marked by a spread of the industry over the

entire state and the building of twenty-seven new furnaces with only five old furnaces being abandoned.

The following table shows the production progress during this period:

Pig Iron Production

Year	Tons
1830	3,165
1833	5,800
1855 ..... Nearly	30,000

In 1853 there were thirty-one furnaces in operation in Allegany, Washington, Frederick, Howard, Anne Arundel, Worcester, Baltimore, Harford, and Cecil Counties and Baltimore City with an annual capacity for pig iron production of about 70,500 tons.

Furnace building activity practically ended in 1855. One furnace was built at Ashland in 1864 and five operations abandoned during the period from 1855 to 1860.

There was a temporary boom in the industry following the outbreak of the Civil War but this was followed by another decline during which a large number of the operations were abandoned.

Production did not decline as fast as the furnace building. In 1880 production was at its maximum. However, Maryland was remaining stationary in production while the other iron producing areas of the country were rapidly forging ahead. With a production of 54,204 tons of pig iron in 1870, Maryland ranked fifth among iron producing States. In 1880 with a production of 53,271 tons it ranked only eleventh.

A continued decline in pig iron prices, and iron ore value reached a point where Maryland ores could not be mined and smelted at a profit and after 1880 a rapid decline in ore and iron production took place. This decline was a result of the opening up of large ore deposits in the Lake Superior Region and in Alabama, with lower mining costs, the erection of larger and more modern blast furnaces using coke as a reducing fuel, better and cheaper transportation facilities, introduction of steel and the country's demand for lower priced iron.

In 1885 only seven furnaces remained in operation and most of these were soon abandoned.

These early operations, while insignificant compared to later iron and steel operations in Maryland and the United States, played an important part in the early industrial activities of Maryland, particularly since they used local raw materials entirely and gave employment to labor, not only in the smelting of ore and forging of iron, but also in mining ore and supplying fuel and fluxing materials.

The early iron and steel industry of Maryland is a good example of the changing economy of a section in that it shows an industry, based on local raw materials built up to where it plays an important part in the industrial activities of the section and is then completely replaced and extinguished by the development of new and cheaper raw materials in other sections and new methods of production. Maryland was fortunate, after such a collapse of this industry, in experiencing a later revival due to the choice of Baltimore as strategic location for a large iron and steel manufacturing plant.

Toward the close of the eighties when the local iron industry became almost extinct, a new era in the Iron and Steel Industry of Maryland was

started with the beginning of the erection of a large plant at Sparrows Point by the Maryland Steel Company in 1887. Production at this plant later raised Maryland's rank as an iron and steel producing state to ninth position.

Most of the ores for this plant came from foreign countries and the plant did not stimulate the production of Maryland ores. During the period of 1850 to 1910 the production of iron ores in Maryland ranged between 139 and 981 tons per annum, the minimum being in 1895 and the maximum in 1880. Practically all of the ore during this period was shipped to other States.

The location of the Maryland Steel Company plant at Sparrows Point, Maryland, was an outgrowth of the increasing demand for Bessemer Steel for railroad rails and other railroad equipment. The production of Bessemer Steel originated, in this country, in 1867, at the Baldwin plant, which later became the Steelton plant of the Pennsylvania Steel Company near Harrisburg, Pennsylvania. This steel was produced from pig iron made from low phosphorus ores mined in Eastern Pennsylvania and New Jersey.

Increasing development of the industry created a shortage of such ores for plants east of the Allegheny Mountains and the industry began the importation and use of Spanish and Algerian ores.

In 1882 large deposits of low phosphorus magnetic iron ores were discovered in Cuba in which the Pennsylvania Steel Company acquired extensive interests. To utilize these foreign ores to the best advantage it was advisable to locate the blast furnaces for smelting them at a tidewater point readily reached by coal for producing coke and for other plant operations, from Pennsylvania, West Virginia and Virginia. It was also desirable to locate near a favorable labor supply.

A site adjacent to Baltimore at Sparrows Point, on the north side of the Patapsco River and about ten miles from Baltimore was chosen by the Maryland Steel Company and construction of four blast furnaces was started in 1887.

The original intent to ship pig iron made at Sparrows Point to the company's plants in Pennsylvania for conversion into steel was changed by the developments of using molten pig iron, from the blast furnaces, in the Bessemer Converters and open hearth furnaces and thus utilizing the latent heat of the molten pig iron. This development made it more advantageous to locate the Steel Works and Rolling Mills adjacent to the Blast Furnaces and resulted in the building of the steel works and rolling plants also at Sparrows Point. This plant formed the nucleus of the present large plant of the Bethlehem Steel Company.

The Maryland Steel Company was organized, under the same ownership as Pennsylvania Steel Company in 1891 and took over the Sparrows Point plant. In 1916 the Bethlehem Steel Company acquired all properties and assets of the Pennsylvania Steel Company of Pennsylvania and the Maryland Steel Company. In the same year Bethlehem Steel Company acquired the Baltimore Sheet and Tin Plate Company.

CHAPTER 3

PRESENT BLAST FURNACE, STEEL WORKS, AND ROLLING MILL INDUSTRY OF MARYLAND

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PRESENT BLAST FURNACE, STEEL WORKS, AND ROLLING MILL INDUSTRY OF MARYLAND

The present blast furnace, steel works, and rolling mill industry of Maryland is concentrated in four plants and mostly in one large plant.

The following plants account for more than ninety percent of the pig iron and steel production of the State.

Maryland Plant of the Bethlehem Steel Corporation, Sparrows Point, Maryland

The Eastern Rolling Mill Company, Colgate, Maryland

The H. and G. Taylor Company, Cumberland, Maryland

The Baltimore and Ohio Railroad Company, Cumberland, Maryland.

Maryland Plant of The Bethlehem Steel Corporation

Sparrows Point, Maryland

This plant is the largest producer of pig iron and rolled steel in Maryland and ranks among the ten largest plants in the United States.

It is the only fully integrated plant in Maryland with facilities for iron and steel production from raw materials to finished products.

Its raw materials, ore, limestone, and coal are supplied from mines and quarries owned or controlled by the Bethlehem Steel Corporation in Pennsylvania, West Virginia, in the United States and from Cuba, Chile and other foreign countries.

The plant is strategically located at tidewater within reasonable haulage distance from the company's coal and limestone mines and quarries and for water transportation of foreign ores and distribution of products to large steel consuming centers in seaboard states and abroad.

The bulk of the ore used at this plant comes from the El Tofo mines in Chile which are leased by the Bethlehem Steel Corporation. The ore is transported a distance of fifteen miles, over a company owned railroad to Cruz Grande, where the company has established extensive ore loading facilities. From Cruz Grande to Sparrows Point, the ore is transported in company owned boats.

The El Tofo ores are high grade, average around 66 percent iron as compared to the 51.5 percent average of Lake Superior ores and are low in phosphorus content making them suitable for Bessemer steel operations.

Due to the character of the deposits and cheap labor available, mining costs are low. Taxes and other charges are also low.

With increasing cost of royalties, taxes, mining labor and freight rates and lowering quality of Lake Superior region ores, the position of the Sparrows Point plant with its high grade, low cost ore supply grows more advantageous.

The cost of El Tofo ore at the loading docks, including all charges, ranges from $1.45 to $1.60 per gross ton.

Published figures for transportation by water from Cruz Grande, Chile to Atlantic Seaboard points vary from $3.50 to $4.25 per ton.

On the basis of the above costs at Cruz Grande and transportation to Atlantic Seaboard points the delivered cost would range from $4.95 to $5.85 per gross ton and the cost per unit of iron content would range from 7-1/2 cents to 8-9/10 cents on a basis of 66 percent iron content.

Data with reference to El Tofo ores on this and the following page are from or based on data in "The Feasibility of Establishing an Iron and Steel Industry in the Lower Columbia River Area Using Electric Pig Iron Furnaces" by Raymond M. Miller, Metallurgical Engineer. A War Department publication.

The average cost of equivalent Bessemer grade ores at Lake Erie ports, including credit for iron content above 51.5 percent would be $6.15 per gross ton or 9-32/100 cents per unit of iron content.

The average cost of equivalent Bessemer grade ore in the Pittsburgh area would be the cost at Lake Erie ports of $6.15 plus freight to the Pittsburgh area of $1.25 or $7.40 per ton or 11-2/10 cents per unit of iron content.

From these ore cost figures the Sparrows Point plant would appear to have an advantage over both the Lake Erie and Pittsburgh area plants on ore cost.

The Pittsburgh area with coal and limestone supplies within short hauling distances of the iron and steel plants, has an advantage over both the Lake Erie and Sparrows Point plants on costs of these raw materials. This advantage is partly offset by higher ore cost in the Pittsburgh area.

Confidence in their selection of Sparrows Point as an iron and steel producing location has been expressed by the Bethlehem Steel Corporation in the almost continuous growth and modernization of the Sparrows Point plant which now occupies an area of over 2,000 acres.

Data on ore costs and the transportation are from War Department Report "Feasibility of Establishing an Iron and Steel Industry in the Lower Columbia River Area Using Electric Pig Iron Furnaces," by Raymond M. Miller, Metallurgical Engineer.

Annual capacities of the Sparrows Point plant, as reported by the 1935 Iron and Steel Directory of the Iron and Steel Institute were as follows:

Coke . . . . . 1,590,000 Tons and facilities for recovering by-products from the coking operation.

Pig Iron . . . . . 1,663,200 Gross Tons

Steel:	Gross Tons
Basic Open Hearth	2,167,000
Bessemer	300,000
Subtotal	2,467,000
Steel for Casting	4,800

Finished Hot Rolled Products:	
Rails over 60 lbs. per yard	200,000
Plates - Sheared	500,000
Universal	110,000
Black Sheets - Hot Rolled	48,000
Hot Rolled - Annealed	126,000
Black Plate	214,000
Bars - Other than concrete reinforcing . . .	23,000
Concrete reinforcing	42,000
Wire Rods	160,000
Skelp	235,000
TOTAL	1,458,000

Other Finished Products: (Note)	Gross Tons
Fabricated Structural Material	24,000
Flanged and Dished Plates	15,000
Galvanized Sheets	84,000
Tin Plate	300,000
Black Plate.	14,000
Pipe - Butt Weld	75,000
Lap Weld	100,000
Galvanized	40,000
Wire - Plain	95,000
Galvanized	40,000
Barbed	9,800
Bale Ties	4,000
Nails and Staples	30,200
Steel Castings	4,800
Iron Castings - Ingot Moulds	10,000
All Others	6,000
Brass and Bronze Castings	700
TOTAL	752,500

Note: Many of these products are made from products listed on the preceding table and the tonnages are therefore not additive.

The following table shows the relation of the Sparrows Point plant capacity; "A", to the total United States capacity; and "B", to the total capacity of all Bethlehem Steel Corporation plants for products made at Sparrows Point; based on the 1935 Iron and Steel Directory annual capacity report. It also shows the rank of the Sparrows Point plant with respect to the United States total.

Product	A Percent	B Percent	Rank
Coke	3.55	24.76	6
Pig Iron and Ferro Alloys	5.15	26.10	7
Steel Ingots and Steel for Castings	5.48	27.50	6
Finished Hot Rolled Products:			
Rails over 60 lbs. per yard	5.73	22.96	6
Plates - Sheared and Universal	7.37	55.93	5
Black Sheets - Hot Rolled and Hot Rolled Annealed	3.67	88.30	7
Black Plate -- Including that for Tinning	7.76	100.00	5
Bars - Other than Concrete Reinforcing	0.29	2.53	9
Concrete Reinforcing	2.71	25.45	10
Wire Rods	3.79	50.15	7
Skelp	0.85	11.32	44
Butt Weld Pipe	3.44	100.00	6
Lap Weld Pipe	5.20	100.00	4
Galvanized Pipe	4.36	100.00	5
Wire - Plain	2.36	51.35	9
Galvanized, barbed, nails and staples	2.12	50.96	8
Cold Rolled Sheets	2.01	100.00	7
Galvanized sheets and Long Terne	4.03	100.00	7
Tin and Terne Plate	7.51	100.00	5

Further extensive additions to the plant's production facilities have been made since the 1935 Iron and Steel Directory was compiled. These include a hot rolled strip mill of 600,000 tons annual capacity with its finishing end for strip sheets and plates and a cold rolling unit having an annual capacity of 150,000 tons for the manufacture of sheets and tin plate.

The new hot rolled strip mill is designed to roll strip and sheets in widths up to 56 inches wide and from one half inch thickness down to twenty gauge. This is intended to meet growing requirements of a wide range of manufacturing demands, such as, tin plate, furniture and office fixtures, automobile parts, airconditioning equipment, barrels, drums and machinery.

It is significant that the Sparrows Point plant was chosen for these late modernizing additions.

The Eastern Rolling Mill Company

Colgate, Maryland

This is a nonintegrated plant rolling steel products from purchased semi-processed materials.

Its products and annual capacity for producing them, as given by the Iron and Steel Directory for 1935 were as follows:

	Gross Tons
Hot Rolled Annealed Sheets	90,000
Cold Rolled Sheets	90,000
Galvanized Sheets	20,000

Based on the above capacities and the total capacities for Maryland as given in the Iron and Steel Directory for 1935 this plant had 41% of the State's capacity for producing hot rolled annealed sheets; 26% of the State's capacity for producing cold rolled sheets; and 11.5% of the State's capacity for producing galvanized sheets.

The N. and G. Taylor Company

Cumberland, Maryland

This is a nonintegrated plant for rolling steel products from semi-processed materials produced elsewhere.

Its products and annual capacities for their production, as given in the 1935 Iron and Steel Directory are as follows:

	Gross Tons
Black Plate for Tinning	22,000
Coke Tin Plate.	25,000
Charcoal Tin Plate.	4,000
Terne Plate	11,000

The Baltimore and Ohio Railroad Company

Cumberland, Maryland

This plant has been reduced by abandonment and dismantling until it now comprises only a small reclamation operation for processing railroad equipment scrap and converting it into bars and rods.

The products and annual capacity for producing them as given in the 1935 Iron and Steel Directory are as follows:

	Gross Tons
Merchant Bars	4,000
Bolt, Nut and Rivet Bars and Rods	6,000

CHAPTER 4

ANNUAL CAPACITIES AND PRODUCTION

CHAPTER 4

ANNUAL CAPACITIES AND PRODUCTION

A study of the capacity of producing pig iron and steel ingots and the production of pig iron and steel ingots over a long range period (1901-1936 inclusive,) was made to observe the trend in furnace building in relation to production and whether there was evidence of serious overexpansion.

Pig iron and steel ingots are the base semi-processed materials from which most of the iron and steel products are made and are therefore, the indicators of iron and steel operation rates. Steel ingot production, due to the varying percentages of pig iron and scrap used in making steel ingots, is the most definite indicator of the rate of iron and steel operations.

Exhibit 1, page 26 - Shows the national trend in blast furnace capacity for 1901-1936 inclusive and the national production of pig iron for the same period.

Exhibit 2, page 28 - Shows the national trend in steel ingot production capacity for 1901-1936 inclusive and the national production of steel ingots for the same period.

Exhibit 3, page 30 - Shows the Maryland trend in blast furnace capacity for 1925-1936 inclusive and Maryland production of pig iron for the same period. Data for earlier years were not available.

Exhibit 4, page 32 - Shows the Maryland trend in steel ingot production capacity for 1925-1936 inclusive and steel ingot production for the same period. Data for earlier years were not available.

The ingot production tonnage figures for Maryland are not published and these figures have been omitted on the Maryland exhibits.

While Maryland had six blast furnaces during the 1925-1936 period a part of these were under repair during the first part of the period. A study of Exhibit 1 shows the following:

1. That the United States capacity for producing pig iron rose continuously from 1901 to 1924 and then began a decline to 1936. Abrupt declines in the period from 1924 to 1936 are partly accounted for by the Survey Committee of the Iron and Steel Institute dropping long idle and abandoned furnaces from the capacity reported.

The general downward trend from 1924 to 1936 is probably partly due to nonreplacement of abandoned furnaces and partly to greater use of scrap in the production of ingots. As the uses of iron and steel in consumer goods increase the available supply of scrap may be expected to increase and result in the use of less pig iron and more scrap in ingot production.

2. That the United States unutilized capacity, represented by the area between the capacity and production curves, Exhibit 1, does not indicate a serious overexpansion in capacity for pig iron production. In periods of high production the full capacity was closely approached and the average utilization for the entire period was 80.9 percent.

3. That the production of pig iron, while having a general upward trend from 1901 to 1929 inclusive, is characterized by considerable irregularity of production due to fluctuating demand for iron and steel products. The drastic decline from 1929

to 1932 and recovery from 1932 to 1936 show the greatest deviation from normal operation of the entire period.

A study of Exhibit 2 shows the following:

1. That the United States capacity for producing ingots rose continuously from 1901 to 1924, dropped slightly in 1925, continued its uptrend from 1926 to 1932 and then became practically stationary to 1936. The slight drop in 1925 is due largely to dropping of long idle and abandoned furnaces from reported capacities.

2. That the United States unutilized capacity for ingot production represented by the area between the capacity and production curves, Exhibit 2, does not indicate a serious overexpansion in capacity for ingot production. In periods of high production the full capacity was closely approached and the average utilization for the entire period was 64.4 percent.

3. That the production of ingots, while having a general upward trend from 1901 to 1929 inclusive, is characterized by considerable irregularity of production due to fluctuating demand for iron and steel products. The production cycle from 1929 to 1936 shows the greatest deviation from normal in the entire period and reflects the effect of the depression on iron and steel consumption.

The building of blast furnaces, open hearth furnaces, Bessemer converters and the allied equipment of these requires

considerable time and the policy of the Iron and Steel Industry has been to anticipate future increased demand and build ahead of it.

A study of Exhibit 3 shows the following:

1. That part of Maryland's pig iron capacity was not available for production, due to rebuilding and repairs, during the period 1926-1932 inclusive. The capacity curve shows only the available capacity during this period.

2. That the unutilized, Maryland capacity, represented by the area between the installed capacity line and production curve, Exhibit 3, is very large, indicating a considerable excess capacity for pig iron production. When only the available capacity is considered the excess capacity is not so apparent. There appears to have been considerable building of pig iron production capacity in anticipation of increasing demand for pig iron for shipment and plant use.

3. That the Maryland production of pig iron followed the United States trend upward from 1925 to 1929 inclusive and then followed the United States downward trend to 1932 but held above the United States average, its low point being 22.8 percent of capacity as compared to the United States average of 17.2 percent. From 1932 to 1936, Maryland's production followed the United States upward trend at a somewhat more rapid rate than the United States average.

4. The average utilization of pig iron production capacity for Maryland (based on available capacity) for 1925 to

1933 inclusive was 58.4 percent as compared to 54.1 percent for the United States average.

A study of Exhibit 4 shows the following:

1. That Maryland's ingot production capacity rose by stages, with intervening lulls, from 1925 to 1932 and then became stationary to 1936.

2. The unutilized capacity, as represented by the area between the capacity and production curves, indicates no serious overexpansion in ingot producing capacity. The production closely approached capacity in years of high production.

3. Utilization of ingot capacity in Maryland ran ahead of the average for the United States, Maryland's utilization being 61.0 percent as compared to 58.1 percent for the United States average.

4. Like the United States production, Maryland's production is characterized by considerable irregularity due to fluctuating demand for iron and steel products.

5. Maryland's percent of ingot capacity utilized in the peak of 1929 production was 93.4 percent as compared to the United States average of 88.5 percent. The Maryland lowest utilization in 1932 was 23.0 percent as compared to the United States average of 19.5 percent. In 1936 Maryland's utilization of ingot capacity was 71.6 percent as compared to the United States average of 68.4 percent and an all time high for ingot production in Maryland was reached in 1936.

With completion of the Bethlehem Steel Company's modernizing and expansion program at Sparrows Point for producing hot and cold rolled strip and increasing production of wire rods, sheets and plates and with a return to a better demand for iron and steel products, their capacity for pig iron and steel ingot production will probably be well utilized.

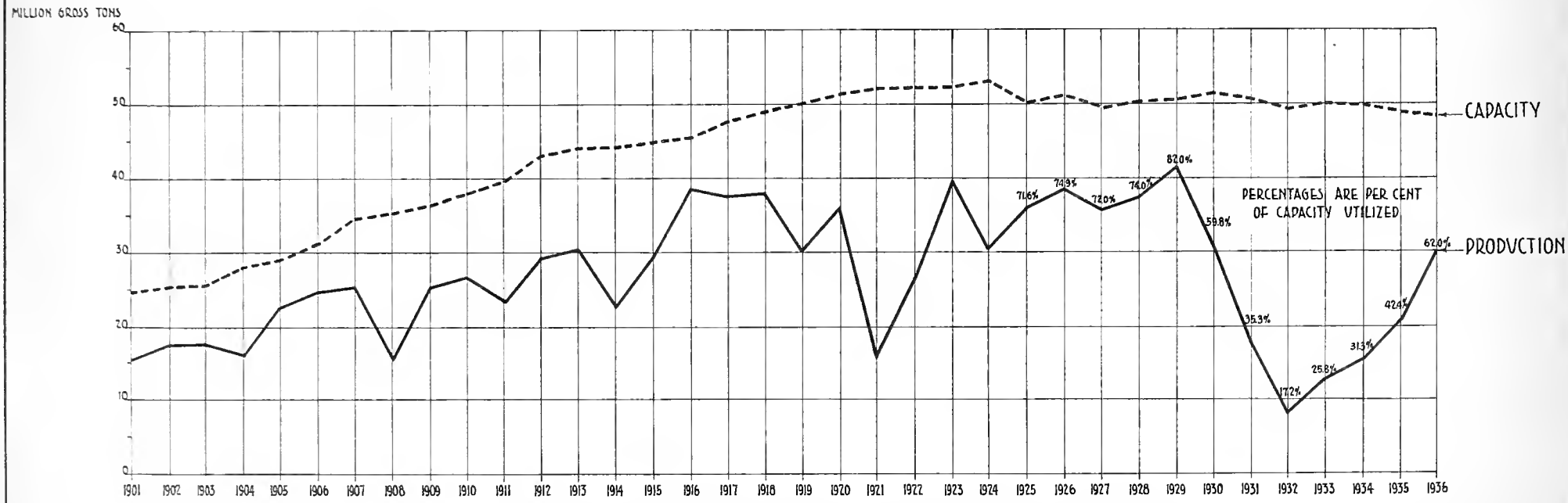
EXHIBIT - 1

IRON AND STEEL INDUSTRY

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS.

TRENDS IN CAPACITY AND PRODUCTION OF PIG IRON FURNACES FROM 1901 TO 1936

~ UNITED STATES ~



PIG IRON

UNITED STATES CAPACITY, PRODUCTION
AND UTILIZATION OF CAPACITY
1901 - 1936 INCLUSIVE

Exhibit No. 1 Table

Year	CAPACITY Thousands of Gross Tons (+000)		PRODUCTION Thousands of Gross Tons (+000)	Percent of Capacity Utilized
1901	24,812		15,489	62.4
2	25,457	e	17,550	68.9
3	25,779	e	17,765	68.9
4	28,114		16,207	57.6
5	29,238	e	22,640	77.4
6	31,285	e	24,930	79.7
7	34,832		25,357	72.8
8	35,529	e	15,718	44.2
9	36,595	e	25,437	69.5
1910	38,059	e	26,949	70.8
11	39,962		23,375	58.5
12	43,257		29,384	67.9
13	44,395		30,618	68.9
14	44,405		22,998	51.8
15	45,033		29,525	65.6
16	45,864		38,763	84.5
17	47,948		37,898	79.0
18	49,270		38,101	77.3
19	50,222		30,543	60.8
1920	51,741		36,244	70.0
21	52,488		16,399	31.2
22	52,687		26,825	50.9
23	52,684		39,721	75.4
24	53,435		30,875	57.8
25	50,424		36,116	71.6
26	51,681		38,698	74.9
27	49,808		35,858	72.0
28	50,533		37,402	74.0
29	50,921		41,757	82.0
1930	51,851		31,021	59.8
31	50,938		17,958	35.3
32	49,654		8,550	17.2
33	50,322		13,001	25.8
34	50,134		15,677	31.3
35	49,024		20,781	42.4
36	48,680		30,217	62.0
TOTAL	1,587,065		966,347	60.9

Source: Annual Statistical Reports of the American Iron and Steel Institute, except those capacities marked "e" which are estimated.

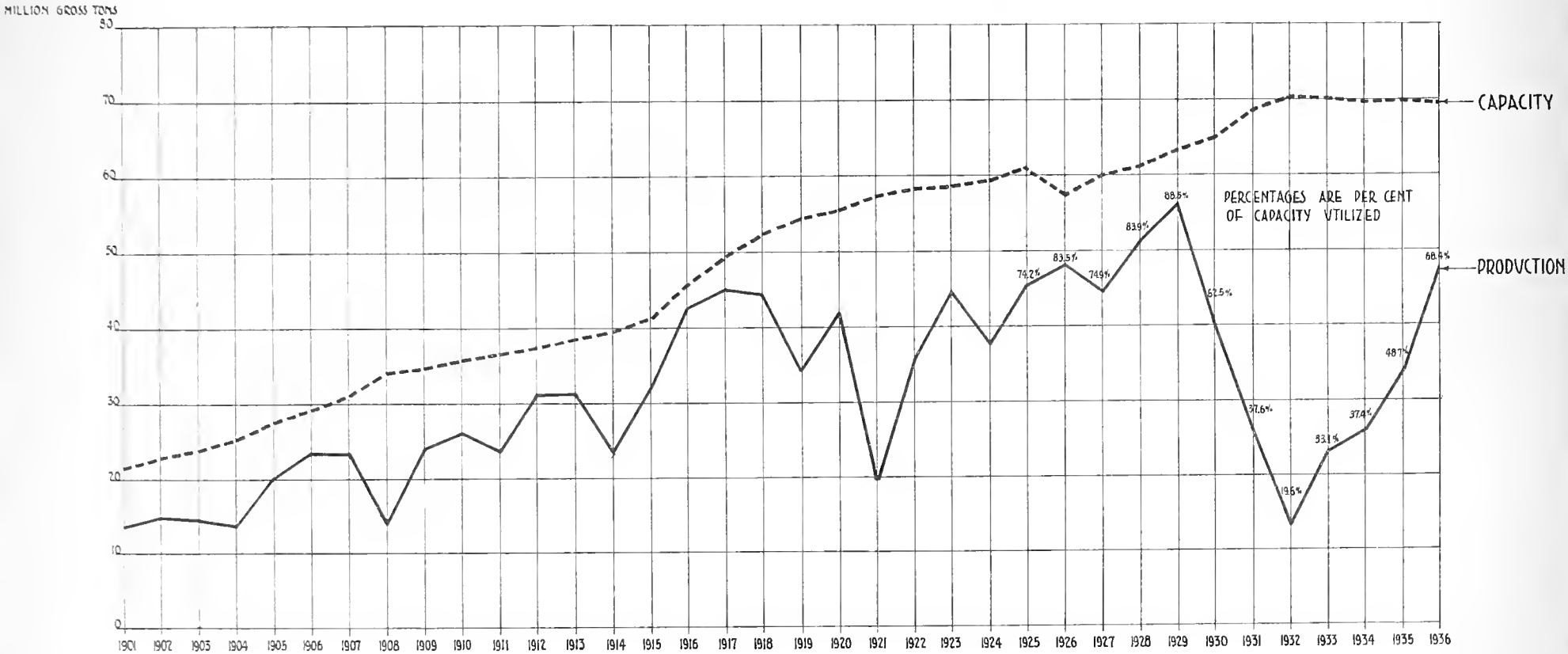
EXHIBIT - 2

IRON AND STEEL INDUSTRY

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS.

TRENDS IN CAPACITY AND PRODUCTION OF STEEL INGOTS FROM 1901 TO 1936

~UNITED STATES~



STEEL INGOTS

UNITED STATES CAPACITY, PRODUCTION
AND UTILIZATION OF CAPACITY
1901 - 1936 INCLUSIVE

Exhibit No. 2 Table

Year	CAPACITY Thousands of Gross Tons (+000)		PRODUCTION Thousands of Gross Tons (+000)	Percent of Capacity Utilized
1901	21,463		13,474	62.8
2	22,965	e	14,947	65.1
3	23,884	e	14,535	61.0
4	25,190		13,860	55.0
5	27,457	e	20,024	72.9
6	29,104	e	23,398	80.3
7	31,141	e	23,363	75.0
8	34,140		14,023	41.1
9	34,823	e	23,955	68.8
1910	35,867	e	26,095	72.7
11	36,584	e	23,676	64.7
12	37,316	e	31,251	83.7
13	38,435	e	31,301	81.4
14	39,689		23,513	59.2
15	41,294		32,151	77.9
16	45,788		42,774	93.4
17	49,614		45,061	90.8
18	52,541		44,462	84.6
19	54,483		34,671	63.6
1920	55,637		42,133	75.7
21	57,377		19,783	34.5
22	58,417		35,603	60.9
23	58,645		44,944	76.6
24	59,432		37,932	63.8
25	61,137		45,393	74.2
26	57,813		48,294	83.5
27	60,032		44,935	74.9
28	61,465		51,544	83.9
29	63,784		56,433	88.5
1930	65,166		40,609	62.5
31	68,980		25,946	37.6
32	70,340		13,681	19.5
33	70,191		23,232	33.1
34	69,755		26,055	37.4
35	70,046		34,093	48.7
36	69,790		47,768	68.4
TOTAL	1,760,755		1,135,002	64.4

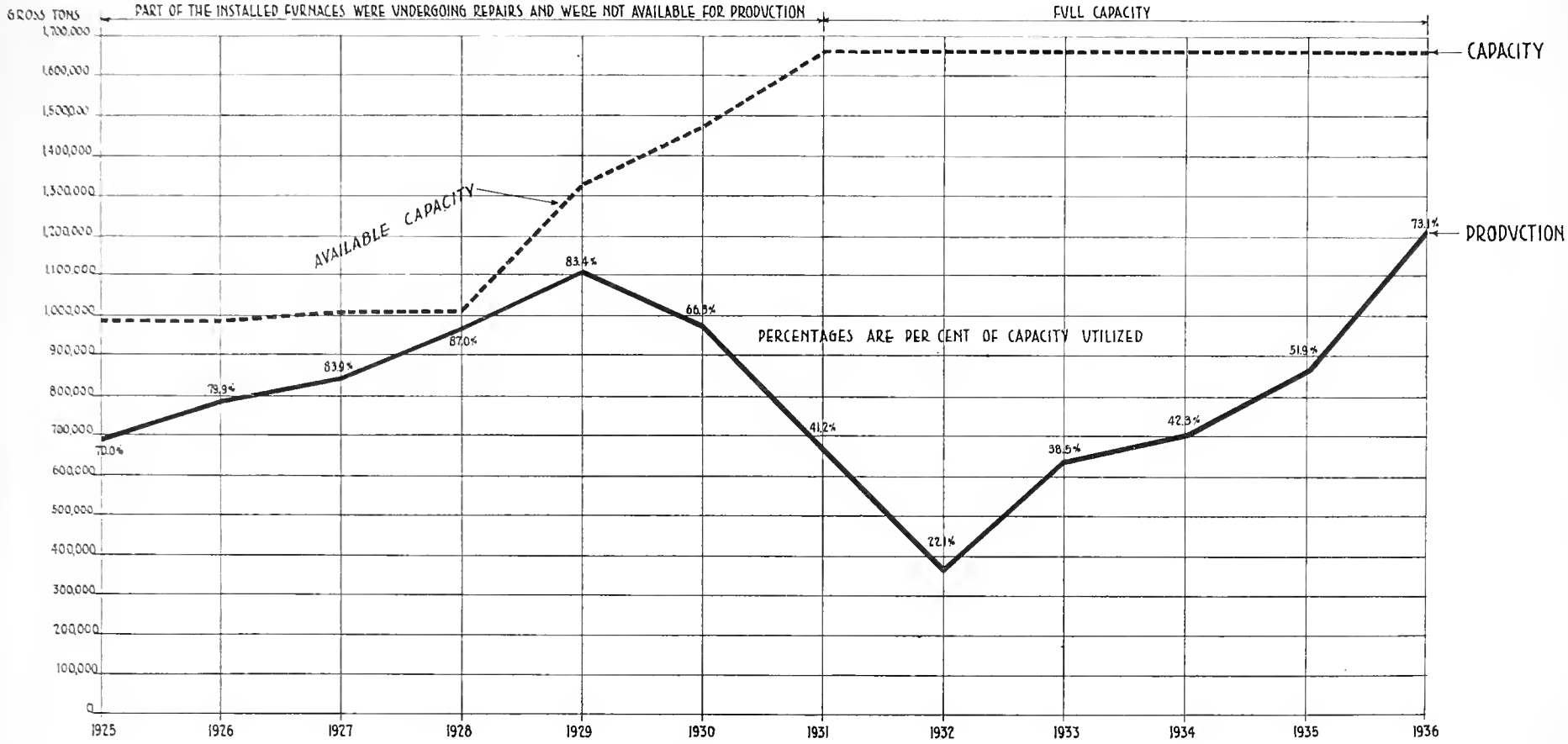
Source: Annual Statistical Reports of The American Iron and Steel Institute, except those capacities marked "e" which are estimated.

EXHIBIT - 3

IRON AND STEEL INDUSTRY

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS.
TRENDS IN CAPACITY AND PRODUCTION OF PIG IRON FURNACES
IN GROSS TONS FROM 1925 TO 1936

MARYLAND



PIG IRON

MARYLAND CAPACITY, PRODUCTION AND UTILIZATION OF CAPACITY 1925 - 1936 INCLUSIVE

Exhibit No. 3 Table

Year	Capacity Gross Tons		Production* Gross Tons	Percent of Capacity Utilized
1925	990,700	c	693,523	70.0
1926	990,700	c	791,637	79.9
1927	1,008,000	c	845,564	83.9
1928	1,117,000	c	971,832	87.0
1929	1,332,400	c	1,111,219	83.4
1930	1,479,600	b	981,466	66.3
1931	1,663,200	a	677,076	40.7
1932	1,663,200	a	367,614	22.1
1933	1,663,200	a	639,539	38.5
1934	1,663,200	a	704,304	42.3
1935	1,663,200	a	863,861	51.9
1936	1,663,200	a	1,215,799	73.1

a - Annual Statistical Reports of the American Iron and Steel Institute

b - Iron and Steel Directory, 1930

c - Estimated

*Production Source: Minerals Year Book, (Bureau of Mines)

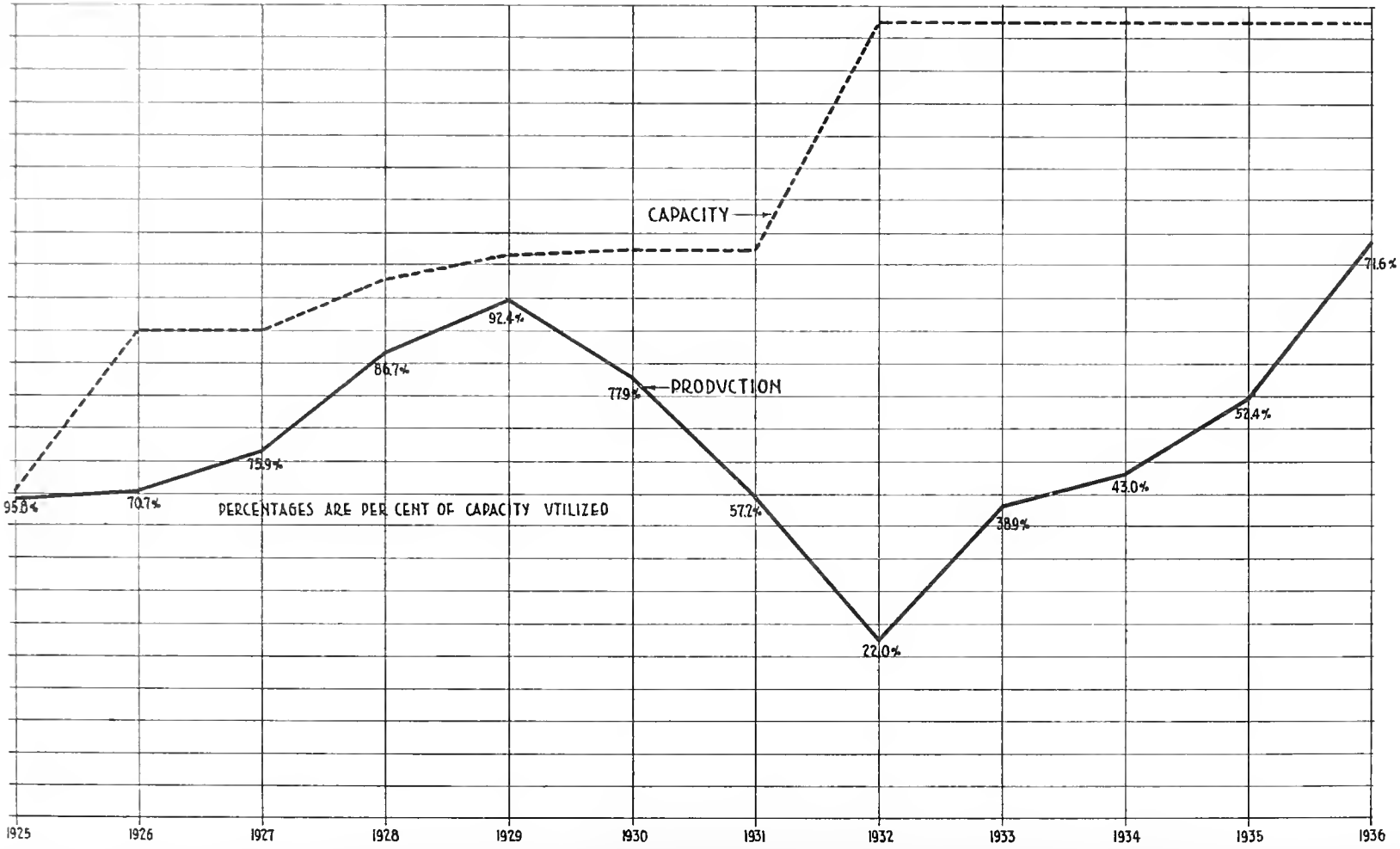
EXHIBIT - 4

IRON AND STEEL INDUSTRY

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS

TRENDS IN CAPACITY AND UTILIZATION OF CAPACITY IN STEEL INGOT PRODUCTION 1925 TO 1936

~MARYLAND~



STEEL INGOTS

MARYLAND, UTILIZATION OF CAPACITY.
1925 - 1936 INCLUSIVE

Exhibit No. 4 Table

Year	Capacity Utilized
1925	95.8%
1926	70.7%
1927	75.9%
1928	86.7%
1929	92.4%
1930	77.9%
1931	57.2%
1932	22.0%
1933	38.9%
1934	43.0%
1935	52.4%
1936	*71.6%

*The lower percentage utilization of capacity in 1936 as compared to 1929 is influenced by a 43 percent increase in capacity. The amount of production actually increased.

CHAPTER 5

PREDOMINANT PRODUCTS AND MARKETS

CHAPTER 5

PREDOMINANT PRODUCTS AND MARKETS

The stability of any industry is dependent:-

1. On the stability of its products in their group of competitive products.
2. On the stability of the markets into which its products move.

In making a study therefore, of the Blast Furnace, Steel Works, and Rolling Mill Industry of Maryland it was essential that a study of the Predominant Products and Predominant Markets be made.

The Predominant Products of the industry, as referred to in this study, are those products which, on a tonnage basis, represent about seventy percent of the total tonnage produced by the industry.

The Predominant Markets for the industry's products, as referred to in this study, are those steel consuming industries which collectively consume about seventy percent of the total steel produced and distributed by the steel industry.

In the charts depicting the predominant products in percent of the total products, the products have been arranged in the order of their predominance with the highest percentage product at the top of the column.

The charts depicting the predominant markets have been prepared in the same manner to illustrate the shifting from year to year in the order of their predominance.

Exhibit 5, page 54, shows the National trend in the total production and predominant products for the years 1929 to 1936 inclusive.

Exhibit 6, page 42, shows the National distribution and the predominant markets or consuming industries which consumed about seventy percent of the total products distributed by the industry in the years 1929 to 1936 inclusive.

Exhibit 7, page 46, shows the Maryland production trend and the predominant products of the industry in Maryland in the years 1929 to 1936 inclusive.

Definite data with respect to the predominant consumers of steel to which Maryland's steel products moved in the years 1929 to 1936 inclusive, are not published and could not be obtained elsewhere. It was therefore, impossible to construct an exhibit similar to Exhibit 6 for Maryland.

Maryland's plants are particularly equipped for the production of plates, sheets, tin plate, wire rods, tubular goods, and rails and it may be assumed that the consumer industries for these products were the same as for the National production.

In Maryland's plants however, plates, sheets, tin plate, and wire constitute a larger proportion of the productive capacity than they do in the National average plant.

From an examination of Exhibit 5 it is evident that eight products account for over seventy percent of the total tonnage produced in each year except 1936 when they accounted for 68.2 percent. With the exception of bars, which occupy first place throughout the period, there is a year to year shifting in the order of predominance of the other products.

From an examination of Exhibit 6 it is evident, in each of the years 1929 to 1932 inclusive, and in 1934 and 1935 that six consumer industries took about seventy percent of the total products distributed.

In 1933 and 1936 other consumer industries come within the seventy percent range of predominant consumers.

From an examination of Exhibit 7 it is evident, in each year from 1929 to 1936 inclusive, that six products of the Maryland industry account for 30.6 to 94.6 percent of the total production.

In every year except 1930 only four products accounted for over seventy percent of the total production. During 1929 to 1931 inclusive these products comprised plates, rails, tin plate, and sheets. During 1932 to 1936 inclusive the four leading products comprising over seventy percent of the total production were plates, sheets, tin plate, and wire rods.

A shifting in the order of predominance is evident in each year.

The shifts in predominant products and order of predominance are related to the shifts in predominance of the consumer industries.

Exhibit 8, page 48:

> This exhibit, which shows graphically the trends in distribution of steel products to predominant steel consuming industries in 1929 to 1936 inclusive shows a high variation in demand for steel products in those industries, particularly in the heaviest consuming industries, Automotive, Building and Railroads which show a drastic decline from 1929 to 1932 and except for the Automotive Industry a slow recovery to 1936.

The demand from the Oil, Gas and Mining Industry declined drastically from 1929 to 1932 and made little recovery from 1932 to 1936.

The Metal Container Industry, not only shows a more stable market for steel but also a growing market. A considerable portion of Maryland's steel production goes to this industry.

The Agriculture Industry market shows less deviation than some of the larger consumers but is one of the smaller markets.

The Agriculture Industry market shows less deviation than some of the larger consumers but is one of the smaller markets.

The highly variable demand for steel products in these predominant markets is responsible for the high variations in rate of steel plant operations.

Better stabilization of the steel industry will depend largely on greater stabilization of these predominant steel consuming industries and the development of other more stable markets.

During 1936 and the first half of 1937 the Iron and Steel Industry staged a meteoric rise, the National production reaching a tonnage close to the 1929 all time peak and the Maryland production reaching a new all time peak above the former 1929 peak.

This was followed by a very rapid decline to a National low of 22.4 percent of capacity in the first week of July 1938. Following the July 4th holiday week and the announcement of lower prices in the last week of June the National rate of operations rose 14 percentage points to 36.4 percent and continued a moderate rate of recovery during the third quarter of 1938 to over 45 percent.

This rise, according to steel trade journals, was largely due to "miscellaneous demand" which has been increasing in recent years and was an important part of the 1937 production. The growth of "miscellaneous demand" which covers uses of all steel products not included under specified headings such as buildings, railroads, automotive, tin containers, etc., is significant as indicating progress in the efforts of the steel industry to increase the diversity of uses of iron and steel, particularly in consumers goods.

Statistics published by Iron Age are of interest in connection with "Miscellaneous Demand." According to these statistics, in an average of the

year 1922 to 1926 inclusive the railroad and building industries combined took 42.3 percent of the total finsihed steel products distributed.

"In 1937 with the National production close to the 1929 record high, these two industries took less than 20 percent of the total distributed while 'miscellaneous demand' accounted for 31.2 percent or more than fifty percent more than the railroad and building industries combined."

"In 1937 the railroad and automobile industries combined took 29.4 percent of the total distributed or 1.8 percent less than 'miscellaneous demand.'"

It is improbable that "miscellaneous demand" will materially change the variable production characteristic of the industry so long as heavy consumers such as the railroads, automobile and building industries fluctuate so widely in their demands. It will, however, have a tendency to prevent production dips to such low levels as have occurred in former years.

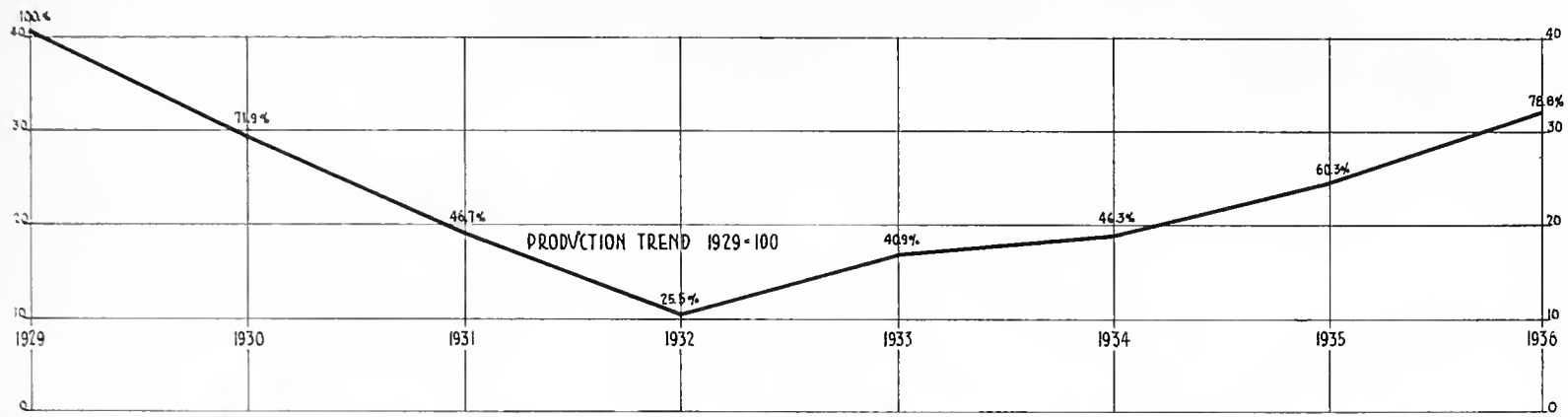
The growth in demand for sheet steel in all-steel bodies of automobiles and trucks and other transportation equipment and in metal containers and the growth in "miscellaneous demand" is of particular interest to Maryland's iron and steel industry which is especially equipped for the production of plates, sheets, tin plate, and wire rods.

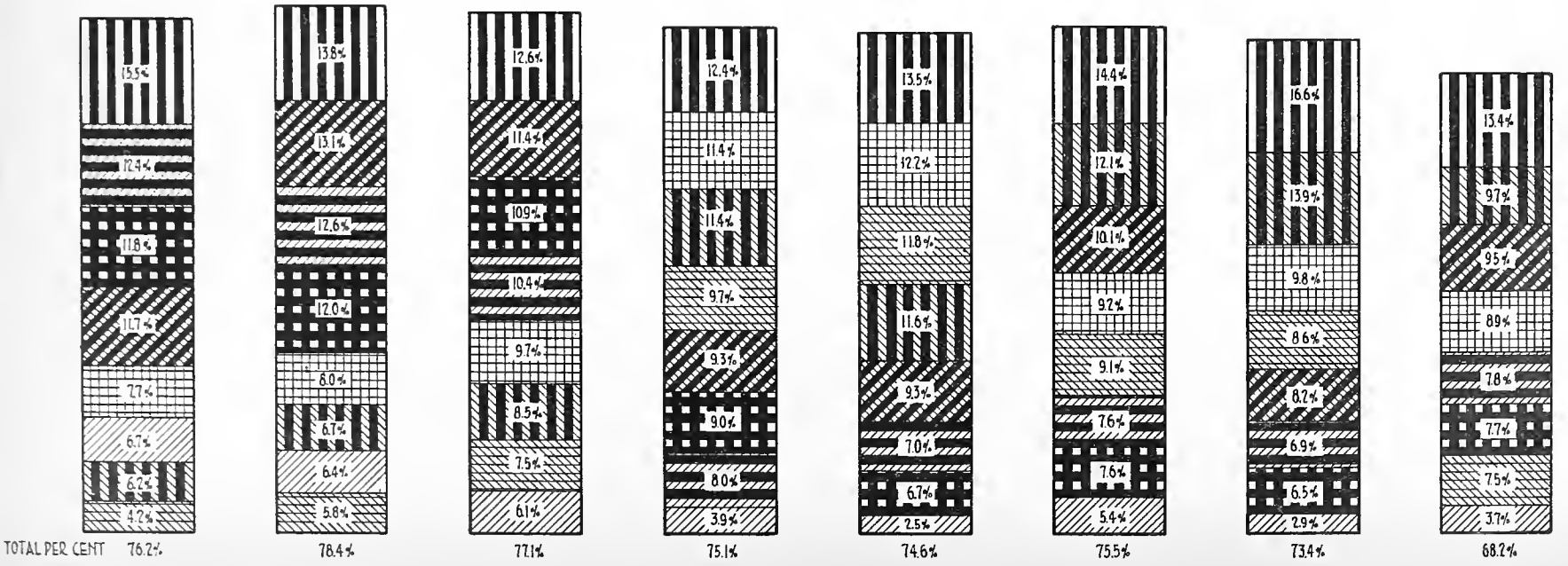
EXHIBIT - 5

IRON AND STEEL INDUSTRY

SHOWING THE TOTAL STEEL PRODUCTS MANUFACTURED FROM 1929 TO 1936
AND THE PREDOMINANT PRODUCTS THAT AMOUNTED TO ABOUT 75 PER CENT OF ALL PRODUCTS MADE.

~UNITED STATES~





LEGEND

- BARS
- BLACK PLATE
- PIPE, SKELP, TUBE-ROUNDS
- PLATES
- RAILS
- SHAPES
- STRIPS
- WIRE-RODS

PREDOMINANT PRODUCTS OF THE BLAST FURNACE, STEEL WORKS AND ROLLING MILL INDUSTRY. ARRANGED IN THE ORDER OF THEIR PREDOMINANCE AND COLLECTIVELY REPRESENTING ABOUT 75% OF ALL FINISHED STEEL PRODUCTS MANUFACTURED DURING 1929 TO 1936 INCLUSIVE.

Exhibit No. 5 Table — UNITED STATES

1929	Thousands of Gross Tons (+000)	Percent	1930	Thousands of Gross Tons (+000)	Percent
Bars, Merchant	6,306	15.5	Bars, Merchant	4,043	13.8
Plates	5,018	12.4	Pipe, Skelp, Tubes, Rounds	3,816	13.1
Shapes	4,798	11.8	Plates	3,662	12.6
Pipe, Skelp, Tubes, Rounds	4,778	11.7	Shapes	3,512	12.0
Wire Rods	3,134	7.7	Wire Rods	2,347	8.0
Rails	2,722	6.7	Strips	1,941	6.7
Strips	2,503	6.2	Rails	1,873	6.4
Black Plate, Tinning	1,699	4.2	Black Plate, Tinning	1,692	5.8
SUBTOTAL	30,958	76.2	SUBTOTAL	22,886	78.4
Other Products*	9,675	23.8	Other Products*	6,311	21.6
TOTAL	40,633	100.0	TOTAL	29,197	100.0

1931	Thousands of Gross Tons (+000)	Percent	1932	Thousands of Gross Tons (+000)	Percent
Bars, Merchant	2,391	12.6	Bars, Merchant	1,285	12.4
Pipe, Skelp, Tubes, Rounds	2,162	11.4	Wire Rods	1,186	11.4
Shapes	2,063	10.9	Strips	1,185	11.4
Plates	1,965	10.4	Black Plate, Tinning	1,000	9.7
Wire Rods	1,844	9.7	Pipe, Skelp, Tubes, Rounds	946	9.3
Strips	1,620	8.5	Shapes	937	9.0
Black Plate, Tinning	1,431	7.5	Plates	830	8.0
Rails	1,158	6.1	Rails	403	3.9
SUBTOTAL	14,634	77.1	SUBTOTAL	7,772	75.1
Other Products*	4,353	22.9	Other Products*	2,580	24.9
TOTAL	18,987	100.0	TOTAL	10,352	100.0

*Other steel products as indicated above, to make a 100% total includes Concrete Bars, Other Sheets, Hoops, Bands, etc., and "Other" Finished Products.

Source: IRON AGE

PREDOMINANT PRODUCTS OF THE BLAST FURNACE, STEEL WORKS AND ROLLING MILL INDUSTRY. ARRANGED IN THE ORDER OF THEIR PREDOMINANCE AND COLLECTIVELY REPRESENTING ABOUT 75% OF ALL FINISHED STEEL PRODUCTS MANUFACTURED DURING 1929 TO 1936 INCLUSIVE.

Exhibit No. 5 Table (Cont'd) UNITED STATES

1933	Thousands of Gross Tons (+000)	Percent	1934	Thousands of Gross Tons (+000)	Percent
Bars, Merchant	2,245	13.5	Bars, Merchant	2,711	14.4
Wire Rods	2,024	12.2	Pipe, Skelp, Tubes, Rounds	2,273	12.1
Black Plate, Tinning	1,964	11.8	Plates	1,896	10.1
Strips	1,929	11.6	Shapes	1,735	9.2
Pipe, Skelp, Tubes, Rounds	1,548	9.3	Wire Rods	1,723	9.1
Plates	1,160	7.0	Strips	1,438	7.6
Shapes	1,109	6.7	Rails	1,425	7.6
Rails	416	2.5	Black Plate, Tinning	1,010	5.4
SUBTOTAL	12,395	74.6	SUBTOTAL	14,211	75.5
Other Products*	4,210	25.4	Other Products*	4,596	24.5
TOTAL	16,605	100.0	TOTAL	18,807	100.0

1935	Thousands of Gross Tons (+000)	Percent	1936	Thousands of Gross Tons (+000)	Percent
Bars, Merchant	4,075	16.6	Bars, Merchant	4,300	13.4
Strips	3,400	13.9	Strips	3,120	9.7
Wire Rods	2,400	9.8	Pipe, Skelp, Tubes, Rounds	3,050	9.5
Black Plate, Tinning	2,100	8.6	Wire Rods	2,850	8.9
Pipe, Skelp, Tubes, Rounds	2,000	8.2	Plates	2,500	7.8
Plates	1,700	6.9	Shapes	2,450	7.7
Shapes	1,600	6.5	Black Plate, Tinning	2,400	7.5
Rails	700	2.9	Rails	1,170	3.7
SUBTOTAL	17,975	73.4	SUBTOTAL	21,840	68.2
Other Products*	6,530	26.6	Other Products*	10,160	31.8
TOTAL	24,505	100.0	TOTAL	32,000	100.0

*Other steel products as indicated above, to make a 100% total includes Concrete Bars, Other Sheets, Hoops, Bands, etc., and "Other" Finished Products.

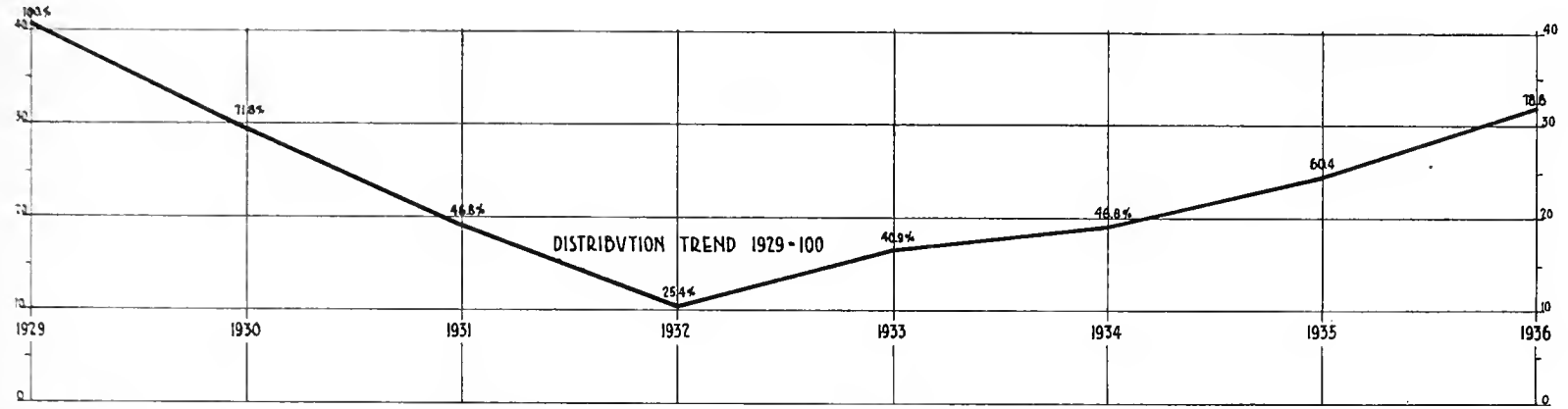
Source: IRON AGE

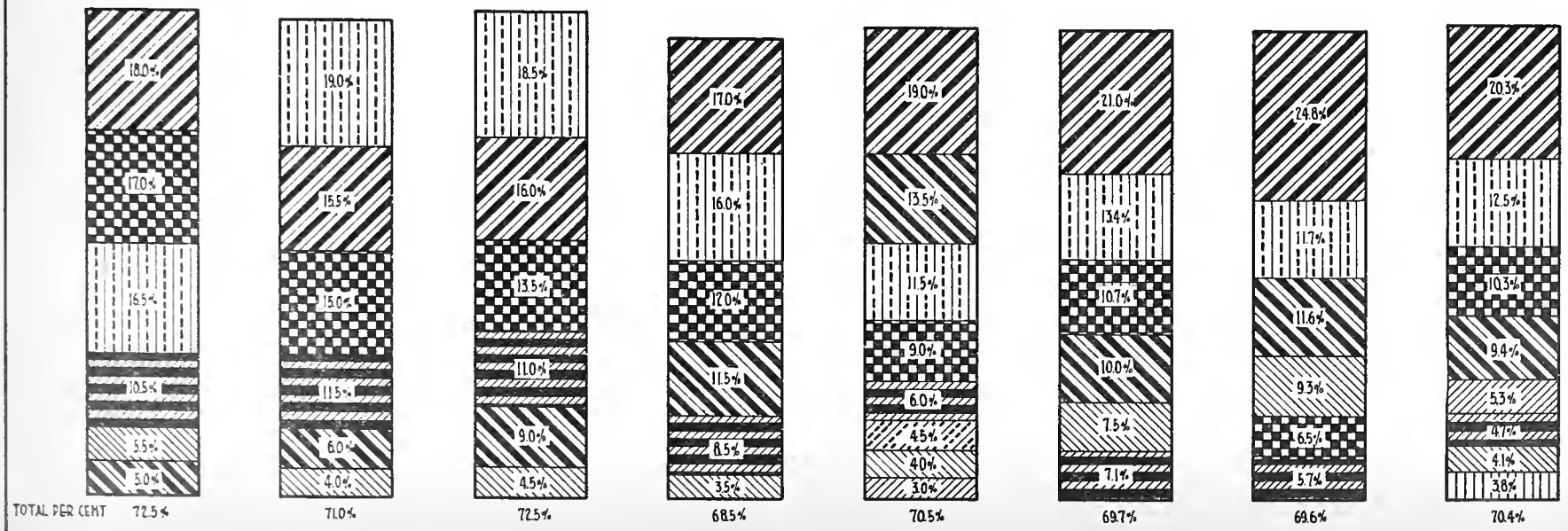
EXHIBIT - 6

IRON AND STEEL INDUSTRY

DISTRIBUTION OF FINISHED STEEL PRODUCTS TO INDUSTRIES AND BY YEARS FROM 1929 TO 1936, SHOWING THE TOTAL DISTRIBUTION IN MILLIONS OF GROSS TONS AND THE PREDOMINANT MARKETS THAT TOOK ABOUT 70 PER CENT OF THE PRODUCTS.

~UNITED STATES~





- LEGEND -

- AGRICULTURE
- AUTOMOTIVE
- BUILDING
- CONTAINERS METAL
- OIL, GAS & MINING
- RAILROADS
- HIGHWAYS
- MACHINERY
- EXPORTS

STEEL CONSUMING INDUSTRIES.

IN THE ORDER OF THEIR PREDOMINANCE
AND COLLECTIVELY REPRESENTING ABOUT 70%
OF THE CONSUMPTION OF FINISHED STEEL
PRODUCTS FROM 1929 TO 1936 INCLUSIVE.

Exhibit No. 6 Table UNITED STATES

1929	Thousands of Gross Tons (000)	Percent	1930	Thousands of Gross Tons (000)	Percent
Automotive	7,300	18.0	Building	5,500	19.0
Railroads	6,900	17.0	Automotive	4,500	15.5
Building	6,700	16.5	Railroads	4,400	15.0
Oil, Gas, Mining	4,300	10.5	Oil, Gas, Mining	3,350	11.5
Agriculture	2,250	5.5	Metal Containers	1,750	6.0
Metal Containers	2,000	5.0	Agriculture	1,150	4.0
SUBTOTAL	29,450	72.5	SUBTOTAL	20,650	71.0
Other Industries*	11,150	27.5	Other Industries*	8,500	29.0
TOTAL	40,600	100.0	TOTAL	29,150	100.0

1931	Thousands of Gross Tons (000)	Percent	1932	Thousands of Gross Tons (000)	Percent
Building	3,500	18.5	Automotive	1,750	17.0
Automotive	3,050	16.0	Building	1,650	16.0
Railroads	2,550	13.5	Railroads	1,250	12.0
Oil, Gas, Mining	2,100	11.0	Metal Containers	1,200	11.5
Metal Containers	1,700	9.0	Oil, Gas, Mining	900	8.5
Agriculture	850	4.5	Agriculture	350	3.5
SUBTOTAL	13,750	72.5	SUBTOTAL	7,100	68.5
Other Industries*	5,250	27.5	Other Industries*	3,200	31.5
TOTAL	19,000	100.0	TOTAL	10,300	100.0

*Includes "Miscellaneous", (see explanation on page following), Shipbuilding, Machinery, Exports and Highways, except in the years where used to make a total of about 70%.

Source: IRON AGE

STEEL CONSUMING INDUSTRIES

IN THE ORDER OF THEIR PREDOMINANCE
AND COLLECTIVELY REPRESENTING ABOUT 70%
OF THE CONSUMPTION OF FINISHED STEEL
PRODUCTS FROM 1929 TO 1936 INCLUSIVE

UNITED STATES

Exhibit No. 6 Table (Cont'd)

1933	Thousands of Gross Tons (+000)	Percent
Automotive	3,150	19.0
Metal Containers	2,250	13.5
Building	1,900	11.5
Railroads	1,500	9.0
Oil, Gas, Mining	1,000	6.0
Highways	750	4.5
Agriculture	650	4.0
Machinery	500	3.0
SUBTOTAL	11,700	70.5
Other Industries*	4,900	29.5
TOTAL	16,600	100.0

1934	Thousands of Gross Tons (+000)	Percent
Automotive	4,000	21.0
Building	2,550	13.4
Railroads	2,050	10.7
Metal Containers	1,900	10.0
Agriculture	1,400	7.5
Oil, Gas, Mining	1,350	7.1
SUBTOTAL	13,250	69.7
Other Industries*	5,750	30.3
TOTAL	19,000	100.0

1935	Thousands of Gross Tons (+000)	Percent
Automotive	6,075	24.8
Building	2,865	11.7
Metal Containers	2,840	11.6
Agriculture	2,270	9.3
Railroads	1,605	6.5
Oil, Gas, Mining	1,400	5.7
SUBTOTAL	17,055	69.6
Other Industries*	7,450	30.4
TOTAL	24,505	100.0

1936	Thousands of Gross Tons (+000)	Percent
Automotive	6,500	20.3
Building	4,000	12.5
Railroads	3,300	10.3
Metal Containers	3,000	9.4
Machinery	1,700	5.3
Oil, Gas, Mining	1,500	4.7
Agriculture	1,300	4.1
Exports	1,200	3.8
SUBTOTAL	22,500	70.4
Other Industries*	9,500	29.6
TOTAL	32,000	100.0

*Includes "Miscellaneous", (see explanation on page following), Shipbuilding, Machinery, Exports and Highways, except in the years where used to make a total of about 70%.

Source: IRON AGE

Exhibit No. 6 Table (Continued)

MISCELLANEOUS CONSUMING INDUSTRIES

The finished products that are classified under the heading of Miscellaneous (as used in Iron Age data) are shown in percentages of the total product, by years, in the following tabulation.

The average for eight years is 20.8 percent or about one fifth of the entire output.

This miscellaneous item includes products distributed to Warehouses and Jobbers. Almost every item of steel products is included and products distributed from warehouses and jobbers go to almost every industry.

"MISCELLANEOUS"*

Year	Thousands of Gross Tons to Miscellaneous Consumers (000)	Thousands of Gross Tons Total Product (000)	Percent
1929	7,700	40,600	19.0
1930	6,000	29,150	20.5
1931	3,900	19,000	20.5
1932	2,100	10,300	20.5
1933	4,150	16,600	25.0
1934	2,340	19,000	15.4
1935	4,720	24,505	19.3
1936	8,800	32,000	25.9
Total	39,810	191,155	20.8

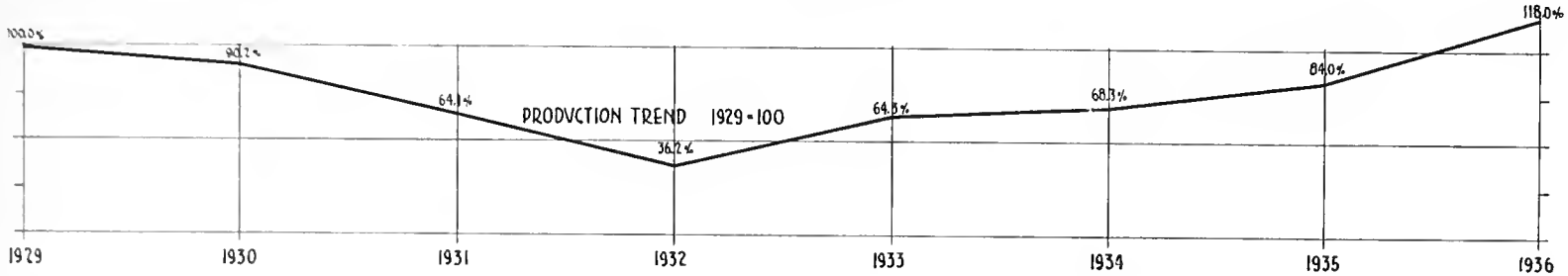
* "Miscellaneous" includes Shipbuilding, Machinery, Exports and Highways, except in the years where used to make a total of about 70%.

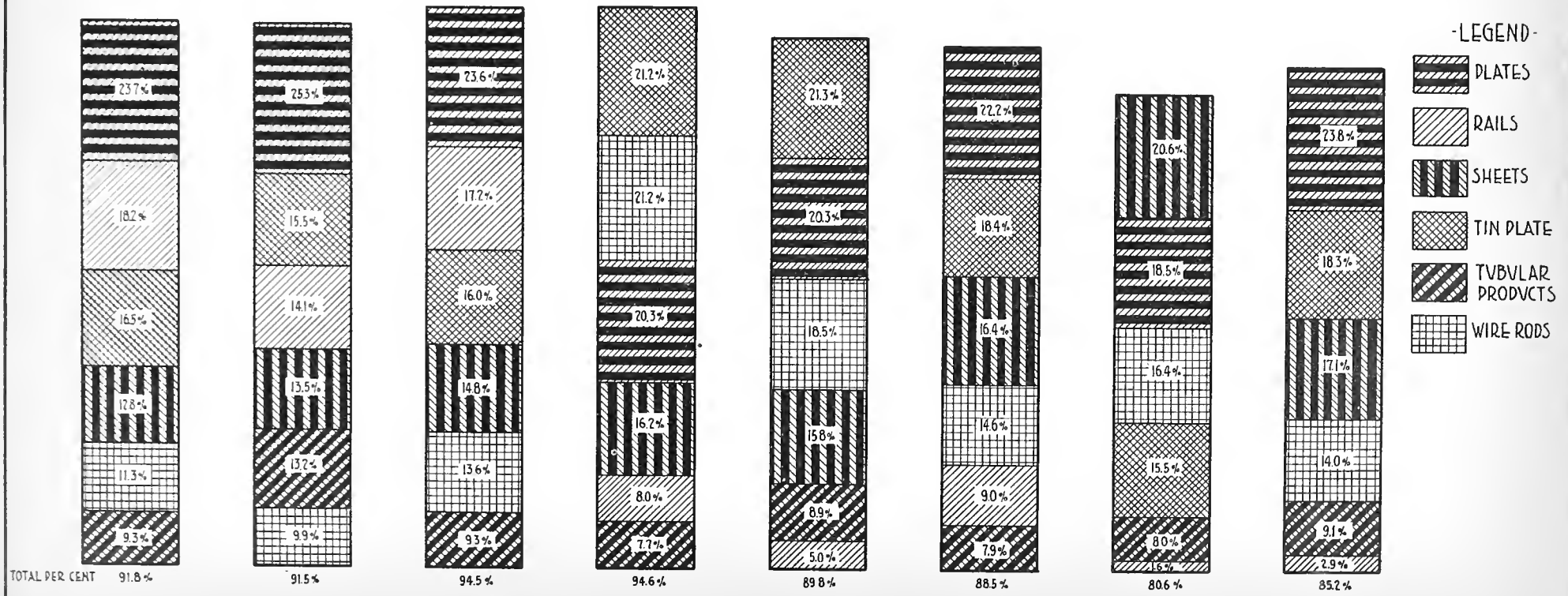
EXHIBIT - 7

IRON AND STEEL INDUSTRY

PRODUCTS OF THE IRON AND STEEL INDUSTRY IN MARYLAND SHOWING THE STEEL PRODUCTS MANUFACTURED FROM 1929 TO 1936 AND THE PREDOMINANT PRODUCTS THAT AMOUNT TO BETWEEN 80 AND 95 PER CENT.

-MARYLAND-





PREDOMINANT PRODUCTS
OF
THE BLAST FURNACE, STEEL WORKS AND ROLLING MILL INDUSTRIES.
ARRANGED IN THE ORDER OF THEIR PREDOMINANCE
FOR THE YEARS 1929 TO 1936 INCLUSIVE.

MARYLAND

Exhibit No. 7 Table

1929		1930		1931		1932	
	Percent of Total Gross Tons Production		Percent of Total Gross Tons Production		Percent of Total Gross Tons Production		Percent of Total Gross Tons Production
Plates	23.7	Plates	25.3	Plates	23.6	Tin & Terne Plate	21.2
Rails	18.2	Tin & Terne Plate	15.5	Rails	17.2	Wire Rods	21.2
Tin & Terne Plate	16.5	Rails	14.1	Tin & Terne Plate	16.0	Plates	20.3
Sheets	12.8	Sheets	13.5	Sheets	14.8	Sheets	16.2
Wire Rods	11.3	Tubular Products	13.2	Wire Rods	13.6	Rails	8.0
Tubular Products	9.3	Wire Rods	9.9	Tubular Products	9.3	Tubular Products	7.7
All Other	8.2	All Other	8.5	All Other	5.5	All Other	5.4
Total	100.0	Total	100.0	Total	100.0	Total	100.0

1933		1934		1935		1936	
	Percent of Total Gross Tons Production		Percent of Total Gross Tons Production		Percent of Total Gross Tons Production		Percent of Total Gross Tons Production
Tin & Terne Plate	21.3	Plates	22.2	Sheets	20.6	Plates	23.8
Plates	20.3	Tin & Terne Plate	18.4	Plates	18.5	Tin & Terne Plate	18.3
Wire Rods	18.5	Sheets	16.4	Wire Rods	16.4	Sheets	17.1
Sheets	15.8	Wire Rods	14.6	Tin & Terne Plate	15.5	Wire Rods	14.0
Tubular Products	8.9	Rails	9.0	Tubular Products	8.0	Tubular Products	9.1
Rails	5.0	Tubular Products	7.9	Rails	1.6	Rails	2.9
All Other	10.2	All Other	11.5	All Other	19.4	All Other	14.8
Total	100.0	Total	100.0	Total	100.0	Total	100.0

Note: Regardless of the amount of the percentage, "All Other" is placed last.

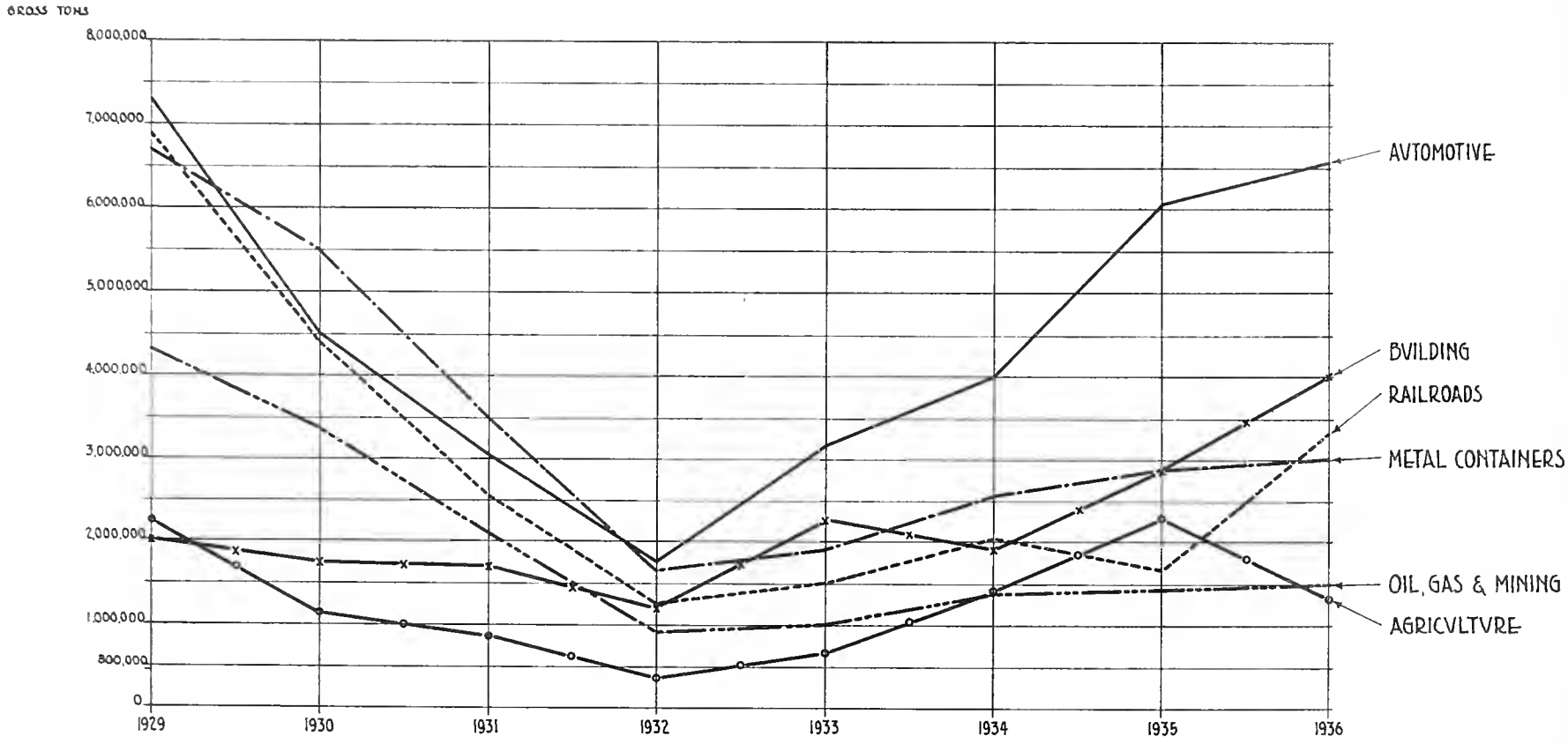
Source: The percentage computations are based on confidential data.

EXHIBIT - 8

IRON AND STEEL INDUSTRY

TRENDS IN DISTRIBUTION OF STEEL PRODUCTS TO PREDOMINANT CONSUMERS
1929 TO 1936 INCLUSIVE.

~UNITED STATES~



BLAST FURNACES, STEEL WORKS AND ROLLING MILLS.

DISTRIBUTION TO THE PRINCIPAL CONSUMERS OF
FINISHED STEEL PRODUCTS, IN GROSS TONS,
FROM 1929 TO 1936, SHOWING TRENDS
FROM 1929 = 100.

Exhibit No. 8 Table

UNITED STATES

Year	Automotive		Railroads		Buildings		Oil, Gas and Mining		Agriculture		Containers Metal	
	Thousands of Gross Tons (+000)	% 1929= 100	Thousands of Gross Tons (+000)	% 1929= 100	Thousands of Gross Tons (+000)	% 1929= 100	Thousands of Gross Tons (+000)	% 1929= 100	Thousands of Gross Tons (+000)	% 1929= 100	Thousands of Gross Tons (+000)	% 1929= 100
1929	7,300	100.0	6,900	100.0	6,700	100.0	4,300	100.0	2,250	100.0	2,000	100.0
1930	4,500	61.6	4,400	63.8	5,500	82.1	3,350	77.9	1,150	51.1	1,750	87.5
1931	3,050	41.8	2,550	36.9	3,500	52.2	2,100	48.8	850	37.8	1,700	85.0
1932	1,750	24.0	1,250	18.1	1,650	24.6	900	20.9	350	15.6	1,200	60.0
1933	3,150	43.2	1,500	21.7	1,900	28.4	1,000	23.3	650	28.9	2,250	112.5
1934	4,000	54.8	2,050	29.7	2,550	38.1	1,350	31.4	1,400	62.2	1,900	95.0
1935	6,075	83.2	1,605	23.5	2,865	42.8	1,400	32.6	2,270	100.9	2,840	142.0
1936	6,500	89.0	3,300	47.8	4,000	59.7	1,500	34.9	1,300	57.8	3,000	150.0

(See Exhibit No. 6 Table)

Source: IRON AGE

CHAPTER 6

EMPLOYMENT AND WAGES

CHAPTER 6

EMPLOYMENT AND WAGES

Employment

The Iron and Steel Industry ranks among the four largest labor employing manufacturing industries in the United States. In 1929 the industry ranked fourth with 419,500 average monthly wage earners.

The 1930 Census of Population for Maryland shows that a total of 38,521 persons, representing 5.72 percent of the total industrial gainfully employed or 17.3 percent of the total gainfully employed in manufacturing and mechanical industries, were indentified with the Iron and Steel Industry. This industry is one of the State's predominant industries which collectively account for about seventy percent of the non-service industrial employment in the State. It ranks second in importance, being preceded only by the Building Industry with which 43,625 gainfully employed were identified in the 1930 Census.

The 1930 Census statistics divide the Iron and Steel Industry into two components, "Blast Furnaces, Steel Works, and Rolling Mills" with 15,863 gainfully employed and "Other Iron and Steel Industries" with 22,658 gainfully employed.

Blast Furnaces, Steel Works, and Rolling Mills are engaged in the production of pig iron from iron ores, steel ingots from pig iron and scrap and rolled steel products from ingots. The progressive stages of the operation are shown graphically in Exhibit 9, page 61.

Employment in the Blast Furnace, Steel Works, and Rolling Mill Industry has been characterized by considerable irregularity due to the instability of demand and production of iron and steel. The degree of employment fluctuation

has not been as high as that of production due to the necessity, in large iron and steel operations, of maintaining a nucleus of skilled and semi-skilled labor and to some absorption of operating labor, during slack periods in construction and repair work.

In recent years there has also been instituted a share-the-work plan in most plants which assists by giving some employment to a greater number of employees.

The following tables show trends of employment in the iron and steel industry for 1929 to 1935 inclusive for the United States, Maryland and Alabama. Alabama is shown separately due to its being a low cost producing State.

BLAST FURNACES
INDEX OF WAGE EARNER EMPLOYMENT*
1929=100

Year	U. S. Total	Maryland	Alabama
1929	100.0	100.0	100.0
1931	54.4	47.7	61.2
1933	43.4	58.2	40.2
1935	30.3	84.1	56.0

*Source:-Computed from United States Census of Manufactures and private data.

STEEL ROLLING MILLS
INDEX OF WAGE EARNER EMPLOYMENT*
1929=100

Year	U. S. Total	Maryland	Alabama
1929	100.0	100.0	100.0
1931	57.1	80.6	50.4
1933	47.2	80.7	51.1
1935	91.1	103.0	Data not available

*Source:-Computed from United States Census of Manufactures and private data.

These tables show the drop in number of wage earners employed from the high production year 1929 to the low production year in 1932 and recovery in employment as production increased in 1935. Employment in the blast furnaces in Maryland fell lower than the United States average and lower than Alabama but recovered more rapidly from its low point.

In the steel rolling mills, employment dropped with production from 1929 to 1932 then rose as production recovered. The recession in rolling mill employment was not as great as in the blast furnaces and was less for Maryland than for either the United States or Alabama. The Maryland recovery in rolling mill employment from 1932 to 1935 was more rapid and greater than that for the United States.

Fluctuations in employment in the industry as a whole and in Maryland are more strikingly shown in Exhibit 10, page 62 which graphically shows the trend in employment for the United States industry as a whole, trend in employment for Maryland and the trends in production of iron and steel products for each.

The number of wage earners identified with the blast furnace, steel works, and rolling mill industry has shown a general upward trend since 1900 but not in the proportion that production of iron and steel products have increased. This reflects increasing improvement in operating technology and mechanization, particularly directed to reducing the number of stages in the operations of producing the lighter steel products and to reducing the cost of making those products which have been growing in importance in total production of iron and steel products.

In "Statistical Abstract of the United States Department of Commerce, 1937, the following comment is of interest:

"It might seem at first sight that with all this labor-saving machinery there would be fewer jobs in the steel industry today. But as a matter of fact, the reverse is true. Employment in the industry in December 1936 was at the highest point ever reached with over half a million men on the payroll, 5,000 more than were employed in 1929. And the basic wage rates of the country's steel employees are on the highest level in the history of the industry. All of these figures are published by the industry's own statistical experts. The products turned out by the new machinery are so much cheaper and so much more nearly perfect that the use of steel is tremendously increasing, and with it employment increases also."

Outstanding in these developments, has been the large continuous mills including the recently developed continuous strip mills.

Earlier operations of the industry were characterized by long shift hours of labor, seven days per week, when operating at normal rates. The industry began reducing hours of daily labor considerably following 1919 and during operation of the N.R.A. Code made further reductions which have been retained to a large extent.

Difficulty in getting sufficient skilled and semi-skilled labor in times of high production and a desire on the part of labor to increase weekly earnings at such times, are factors to be considered in attempting to hold rigidly to any limited hours per week employment plan.

Due to the fluctuations in iron and steel operations, the average weekly and annual hours of employment in the industry are below the average of other large organizable industrial groups.

Security of Employment

The Blast Furnace, Steel Works, and Rolling Mill Industry is the largest industry in the durable goods group, produces a wide diversity of products and might therefore be expected to be more stable in its operations. It is, however, uncommonly sensitive to changes in general economic conditions and periodic fluctuations in its operations are among the most severe in the United States manufacturing industries.

It has been characterized by periods of high pressure driving for production accompanied by hiring of additional employees and over-time work followed by periods of low production, drastic reduction in employment, and indefiniteness as to resumption of increased operations.

As in most industries which require either skilled and semi-skilled workers and even common labor having some familiarity with the operations, employees are inclined to stick with the industry and wait for an opportunity to get back on the payroll or to more normal working hours and hesitate to seek other employment.

Many employees are untrained for other employment and find difficulty in obtaining. Economic conditions which cause a slump in iron and steel operations are usually preceded by or accompanied by a reduction in other large manufacturing activities which results in reduced opportunities for other employment. When lay-offs or short-time working periods become extended, employees may be reduced to living conditions not conducive to desirable welfare conditions in the community.

Composition of Work Force

Women are employed only in office work in this industry and constitute a

a small proportion of the total workers.

Daugherty, De Chazeau and Stratton in their publication "Economics of The Iron and Steel Industry," give some interesting figures on the composition of steel industry working forces, methods of wage payment and wages.

According to these authors the working force is made up of native and foreign whites and native negroes in varying proportions in different sections of the United States, the proportions for the industry as a whole being, 60 percent native whites, 35 percent foreign whites and 5 percent native negro. In Eastern plants the proportions given are about 45 percent native white, 37 percent foreign white and 10 percent native negro. In Southern plants, 58 percent native white, 2 percent foreign white and 40 percent native negro.

Skilled labor consists almost entirely of white labor and the average working force comprises about 25 percent skilled, 35 percent semi-skilled, and the balance common labor.

They state that improved mechanization in rolling mills has tended to materially reduce the amount of skilled labor required in the production of rolled products, particularly of wire rods, plates, sheets, and strips.

Wages

According to the same authors, methods of paying employees in the industry vary considerably depending on the department in which they work and character of work.

Clerical and office employees are usually paid by the week or month.

In the plants, laborers are paid by the hour, by piece work or by tonnage output. The proportion working under these different methods of paying;

vary widely in the same plant, in different plants and districts from about fifty percent on hourly rates and fifty percent on piece and tonnage output rates in northern districts to seventy percent hourly and thirty percent piece or tonnage output rates in southern district plants.

In the steel making departments the ratio of hourly rate workers to piece and tonnage output rate workers is about sixty to forty and in the rolling mills, employing more skilled workers, about thirty-five to sixty-five.

"Hourly earnings offer a better means of comparison with other industries, varying more widely in the iron and steel industry than in any other comparable industry, varying from as low as twenty cents per hour for common labor to over two and one-half dollars per hour for highly skilled labor prior to the N.R.A. Code."

Their comparison of earnigs of steel plant employees with the average of a group of comparable industries in a year of prosperity (1929) and a year of depression (1932) is shown in the following table. The group of industries used for comparison included Agricultural Implement, Foundry and Machine Shop, Chemical, Electrical Equipment, Rubber Tire and the Automobile industries.

	1929	1932
Group Average Weekly Earnings	$ 28.00	$ 18.33
Iron and Steel Industry Weekly Earnings	33.60	15.20
Group Average Annual Earnings	$1,550.00	$843.00
Iron and Steel Industry Annual Earnings	1,620.00	550.00

The comparison shows that the average weekly and annual earnings of iron and steel employees were higher than the average for the group in 1929 but were very much lower than the group averages in 1932.

Average hourly wage and pay rates vary between Northern, Middle Atlantic and Southern Districts.

The Bureau of Labor Statistics' Bulletin No. 567 on Wages in the Iron and Steel industry in 1931 shows the average rates paid common labor in 1929 in different districts as follows:-

	Per Hour
Eastern district	37.5 ¢
Pittsburgh district	45.3 ¢
Great Lakes district	45.6 ¢
Southern district	37.9 ¢

The table on page 58 published by the Iron and Steel Institute shows variations in hourly wages and weekly earnings during parts of 1933 and 1934 under N.R.A. Code operations.

The tables on page 49 show, 1929 to 1935 inclusive, trends in Total Wage Disbursements and Average Yearly Wages in Blast Furnace, Steel Works, and in Rolling Mill Operations for the United States as a whole, Maryland and Alabama. Alabama is shown separately as it is a low wage state.

AVERAGE HOURS PER WEEK AND AVERAGE HOURLY AND WEEKLY EARNINGS

BY DISTRICTS IN THE IRON AND STEEL INDUSTRY

September 1933 through September 1934

(Source: American Iron and Steel Institute)

	Average Hourly Earnings	Average Hours Per Week	Average Weekly Earnings
District I - Eastern	57.2 cents	31.8	$ 18.19
District II - Pittsburgh - Johnstown	62.0	28.3	17.55
District III - Youngstown Valley	63.2	29.1	18.39
District IV - Cleveland, Canton, Massillon, Mansfield, Detroit, Toledo.	63.9	30.9	19.75
District V - North and South Ohio River.	63.5	31.2	19.81
District VI - Buffalo	58.5	30.9	18.08
District VII - Indiana, Illinois, St. Louis, Chicago, Kansas City, Duluth. . . .	60.9	31.4	19.12
District VIII - Southern and Birmingham	46.0	31.6	14.54
District IX - Utah, Colorado, Seattle, San Francisco, Los Angeles.	62.4	31.8	19.84
Total - - - - United States	60.9	30.3	18.45

Note: Maryland falls in District I.

BLAST FURNACES
INDEX OF TOTAL YEARLY WAGE DISBURSEMENTS*
1929 = 100

Year	U. S. Total	Maryland	Alabama
1929	100.00	100.00	100.00
1931	45.90	44.50	51.10
1933	37.50	27.20	34.30
1935	45.10	42.20	43.00

INDEX OF ANNUAL EARNINGS PER EMPLOYEE
1929 = 100

Year	U. S. Total	Maryland	Alabama
1929	100.00	100.00	100.00
1931	84.40	92.80	79.40
1933	53.90	47.60	60.60
1935	74.10	50.20	76.80

STEEL WORKS AND ROLLING MILLS
INDEX OF TOTAL YEARLY WAGE DISBURSEMENTS
1929 = 100

Year	U. S. Total	Maryland	Alabama
1929	100.00	100.00	100.00
1931	49.11	64.96	47.13
1933	37.56	50.32	56.67
1935	68.81	74.43	Data Not Available

INDEX OF AVERAGE YEARLY WAGES PER EMPLOYEE
1929 = 100

Year	U. S. Total	Maryland	Alabama
1929	100.00	100.00	100.00
1931	78.80	90.58	93.60
1933	58.90	82.58	71.00
1935	77.70	71.70	Data Not Available

*Source: Compiled from "United States Census of Manufactures" for United States and Alabama." Private sources for Maryland.

The large decline in total yearly wage disbursements in the blast furnace operations from 1929 to 1933 was due to reduced operations resulting partly from reduced demand for steel products and partly to increased use of scrap in steel making.

Maryland's trend in total yearly wage disbursements in the blast furnace operations varied little from the United States and Alabama trends over either the declining or recovering periods.

The greatest decline in annual yearly wages per employee in the blast furnace operations occurred in 1932 and 1933 following wage cuts in the industry. Recovery followed with operations of the N.R.A. but raised annual yearly wages per employee more in the United States as a whole and Alabama than in Maryland.

The steel works and rolling mill operations do not show as great decline in total yearly wage disbursements as the blast furnace operations due to a better rate of operations. The low yearly wage disbursements in 1933 are partly due to low operations and partly to wage reductions.

Maryland employees in the steel and rolling mill operations fared considerably better than the United States total or Alabama employees.

Average yearly wages per employee receded to 1933 and then recovered some due to higher wage rates under the N.R.A. during the latter part of the year and during 1934 but the recovery did not bring them back to 1929 due to shorter hours of work.

In average yearly wages Maryland employees in steel and rolling mill operations fared considerably better than the total United States and Alabama employees mostly due to more hours of work per year.

Fluctuations in wage disbursements in the industry as a whole and in Maryland are more strikingly shown in Exhibit 11, page 65 and following tabulation, which shows the trends in wage disbursements for the industry as a whole and for Maryland 1929 to 1936.

EXHIBIT - 9

IRON AND STEEL INDUSTRY
BLAST FURNACES, STEEL WORKS AND ROLLING MILLS

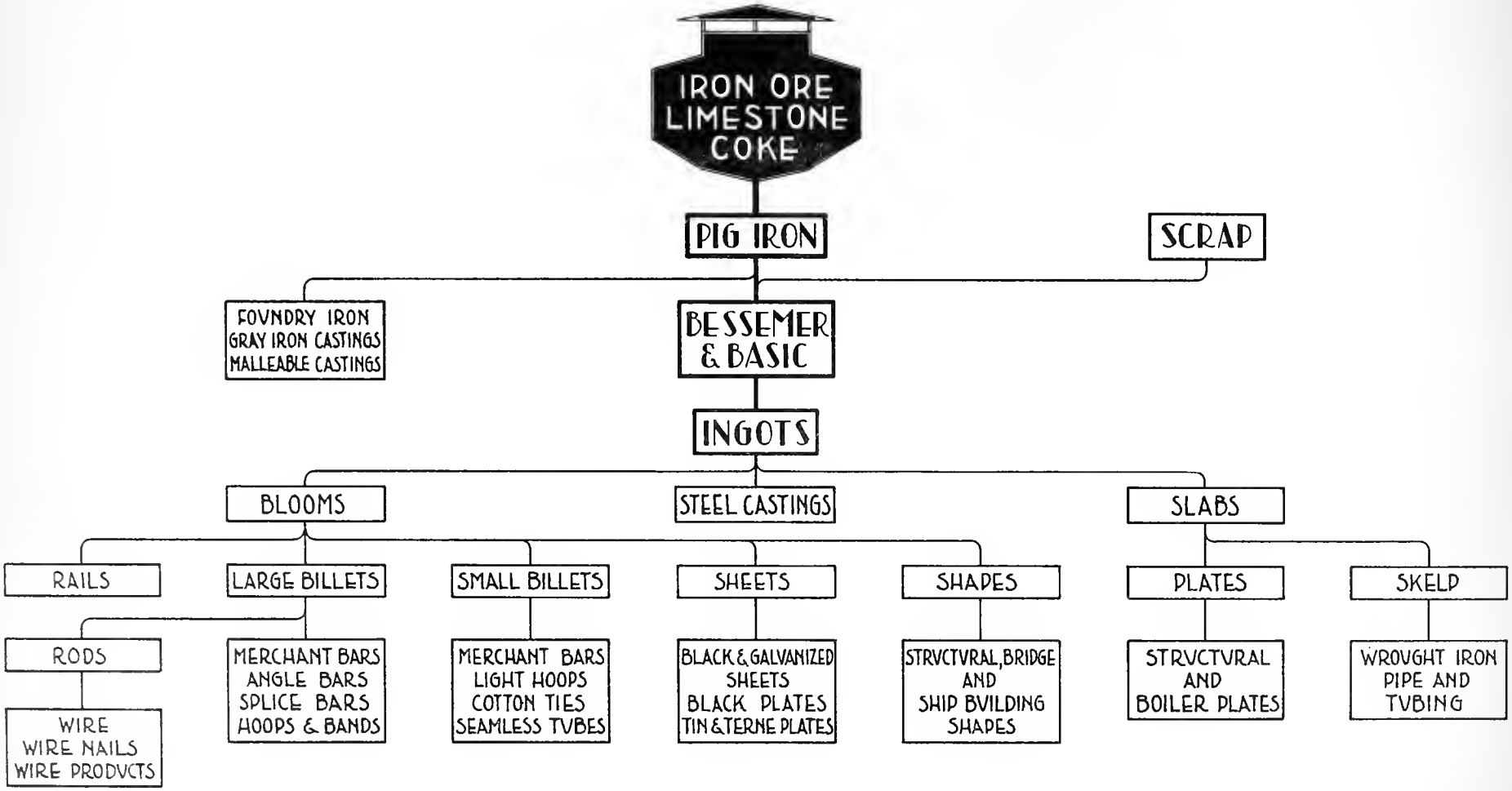
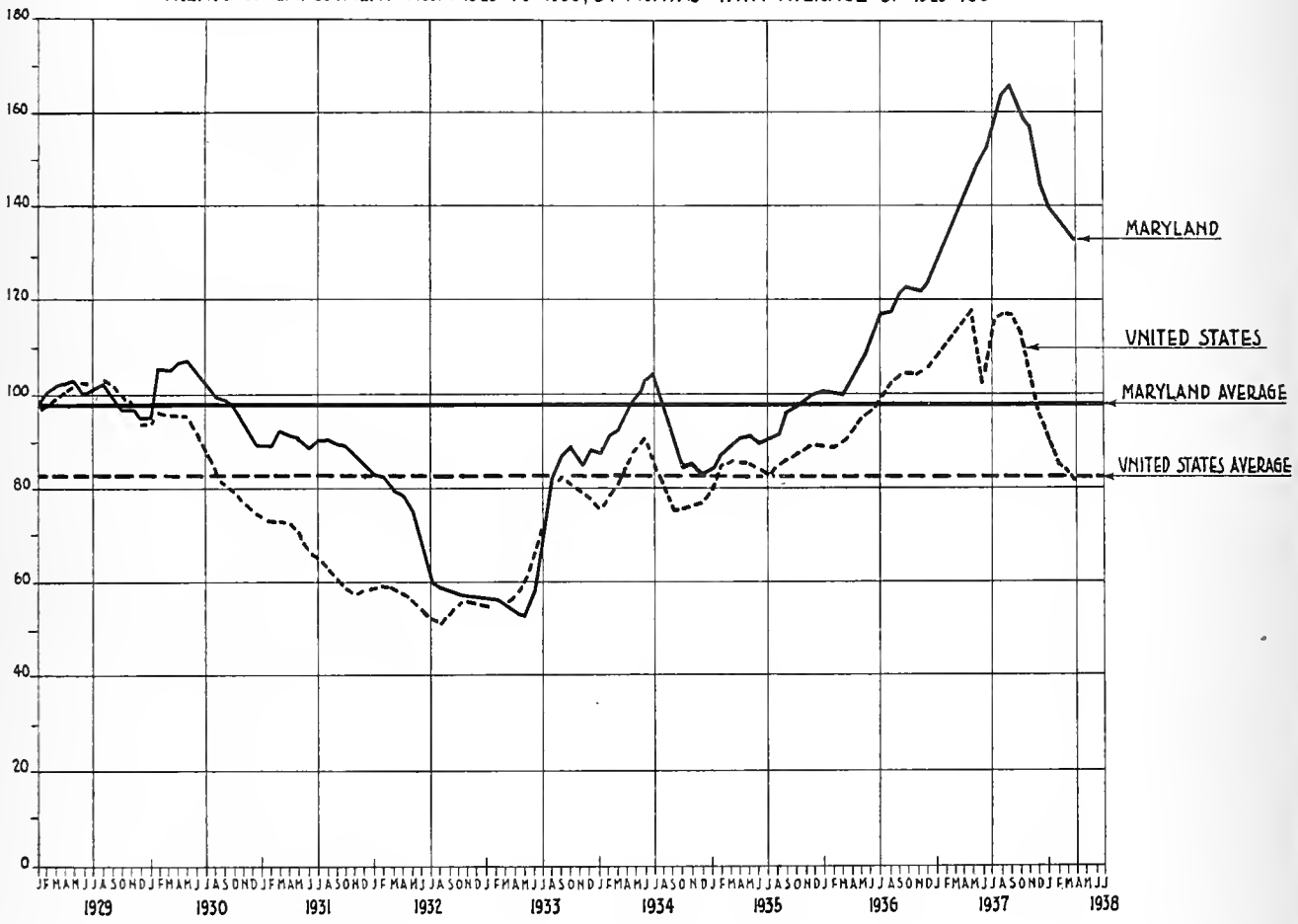


EXHIBIT - 10

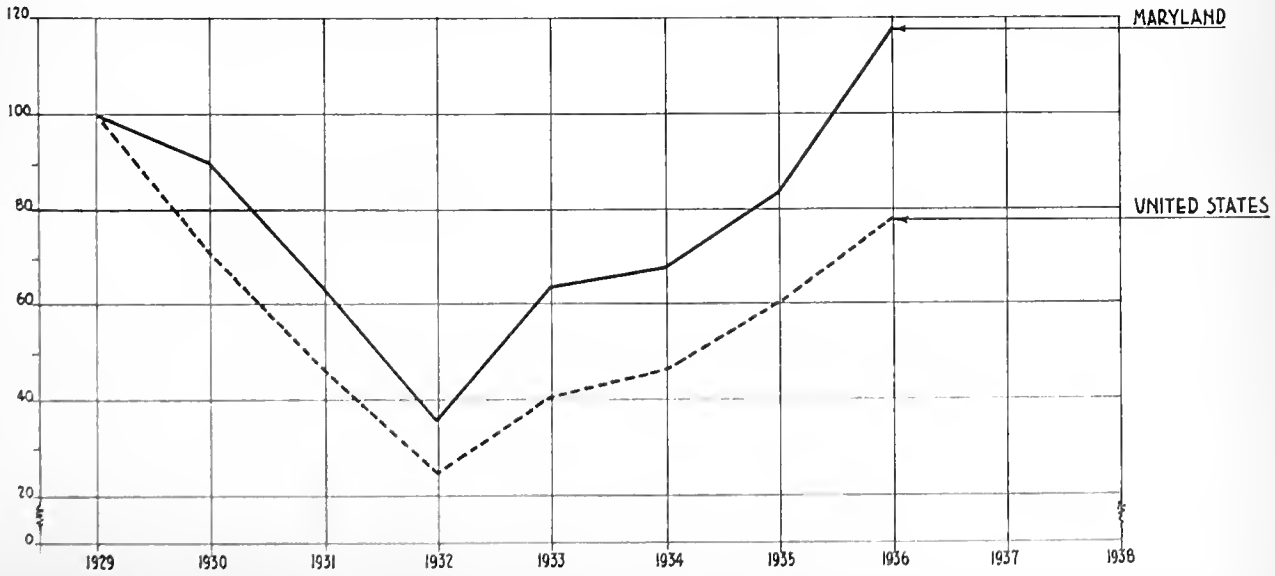
IRON AND STEEL INDUSTRY

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS.

TRENDS OF EMPLOYMENT FROM 1929 TO 1938, BY MONTHS WITH AVERAGE OF 1929-100



TREND OF YEARLY PRODUCTION OF FINISHED STEEL PRODUCTS FROM 1929 TO 1936 WITH PRODUCTION FOR 1929-100



UNITED STATES
INDEXES OF EMPLOYMENT
FOR
BLAST FURNACES, STEEL WORKS AND ROLLING MILLS,
BY MONTHS, FROM 1929 TO 1938

WITH 1929 = 100

Exhibit No. 10 Table.

MONTH	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
January	97.3	94.7	74.1	58.7	54.9	75.5	80.6	89.5	108.0	87.7
February	98.1	96.4	73.4	59.5	57.6	78.2	84.7	88.9	110.1	85.9
March	99.4	95.5	73.5	59.1	55.6	81.4	85.9	89.9	113.5	84.3
April	100.6	95.5	73.1	58.0	57.4	84.7	85.6	92.5	116.5	81.9
May	102.0	94.9	70.3	56.6	60.6	89.1	85.5	95.4	118.2	
June	102.4	91.2	66.2	54.8	65.8	91.9	84.1	96.6	103.9	
July	102.0	86.7	65.2	52.5	73.1	84.1	83.2	99.6	116.2	
August	103.2	82.9	63.7	51.9	80.5	80.9	85.6	102.4	117.6	
September	102.2	80.5	60.9	53.4	82.5	75.9	86.4	103.9	117.3	
October	99.9	79.2	58.7	55.4	80.9	76.0	87.8	104.5	113.8	
November	98.6	77.2	57.9	56.2	78.7	76.5	88.5	104.4	105.2	
December	93.9	75.4	58.5	55.8	77.8	77.7	89.4	105.9	96.5	

Source: Bureau of Labor Statistics, United States Department of Labor
(Adjusted to 1929 = 100)

MARYLAND

INDEXES OF EMPLOYMENT

FOR

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS,

BY MONTHS, FROM 1929 TO 1938

WITH 1929 = 100

Exhibit No. 10 Table (Continued)

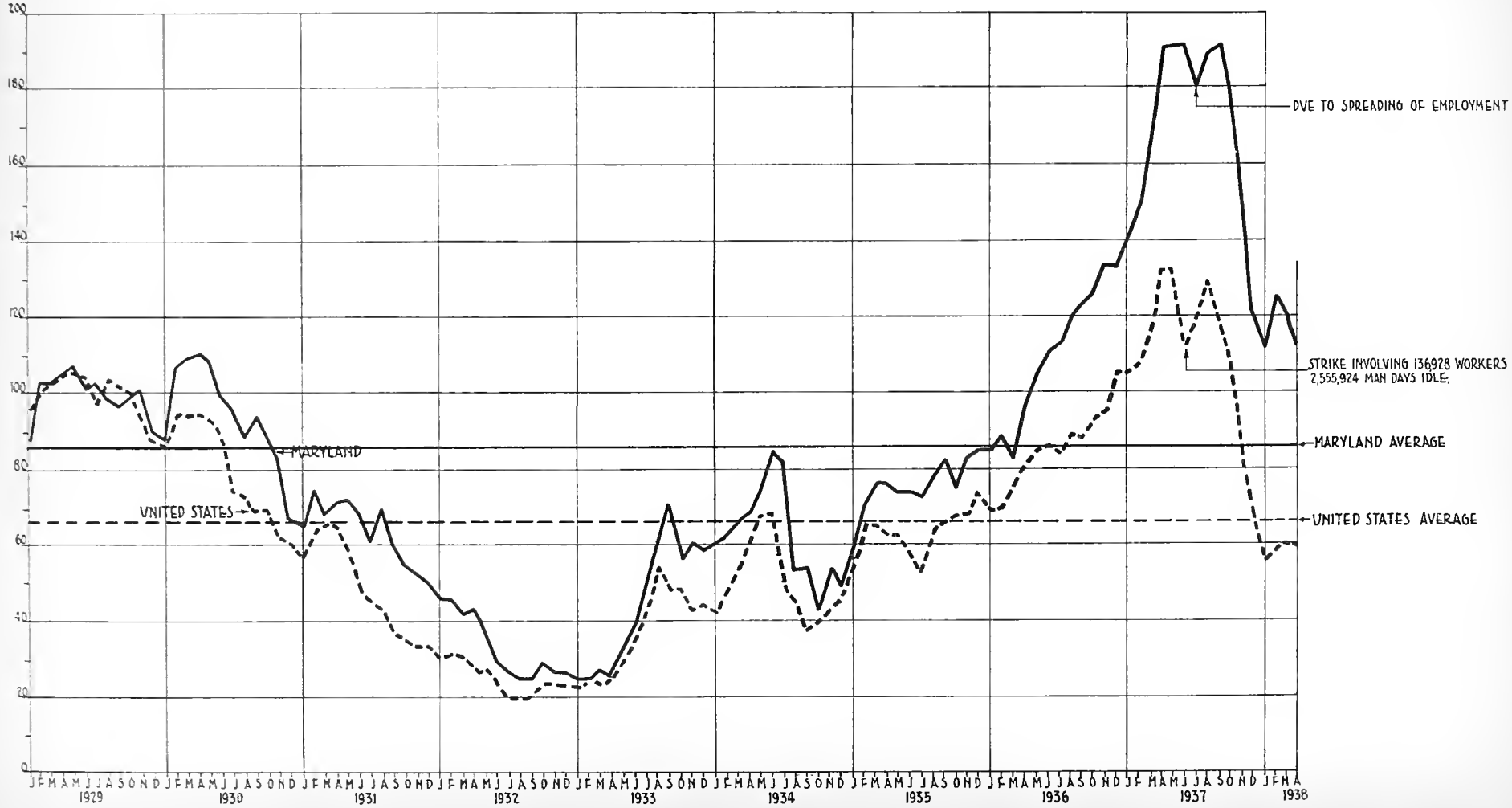
MONTH	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
January	98.0	95.0	89.2	83.0	57.0	87.4	84.1	100.8	129.3	140.2
February	100.8	105.7	89.4	82.8	56.6	91.2	87.1	100.5	133.6	138.3
March	102.6	104.9	92.5	79.3	55.8	92.2	89.0	100.4	138.1	135.8
April	102.4	106.5	90.8	78.3	53.5	96.9	90.8	104.3	143.2	132.5
May	103.0	106.7	90.3	75.2	52.8	99.3	91.2	107.3	147.2	
June	100.5	104.3	88.5	68.6	57.2	103.6	89.8	112.4	151.2	
July	101.5	102.5	90.4	60.1	67.9	105.1	90.7	117.0	158.1	
August	103.0	99.7	90.1	58.6	81.8	98.2	91.5	119.7	164.6	
September	99.6	98.9	89.7	58.2	86.7	91.2	96.4	121.8	166.0	
October	96.8	97.4	89.3	57.6	89.3	84.6	97.7	122.8	160.4	
November	96.7	93.9	86.9	57.2	84.9	85.8	98.8	122.0	157.7	
December	94.7	90.3	84.5	57.3	88.1	83.3	100.3	124.3	146.4	

Source: Commissioner of Labor and Statistics - Baltimore, Maryland.
(Adjusted to 1929 = 100)

EXHIBIT - 11

IRON AND STEEL INDUSTRY

BLAST FURNACES STEEL WORKS AND ROLLING MILLS
TRENDS OF PAY ROLLS FROM 1929 TO 1938 BY MONTHS WITH AVERAGE OF 1929-100



UNITED STATES
INDEXES OF PAY ROLL
FOR
BLAST FURNACES, STEEL WORKS AND ROLLING MILLS,
BY MONTHS, FROM 1929 TO 1938

WITH 1929 = 100

Exhibit No. 11 Table

MONTH	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
January	95.4	86.7	57.2	30.1	22.7	42.3	55.4	69.9	105.7	56.3
February	100.1	95.3	63.0	31.6	24.8	47.4	65.5	70.1	108.1	59.0
March	102.4	94.4	65.5	30.5	23.1	53.6	65.0	75.8	116.1	60.4
April	104.9	95.3	64.7	27.7	25.1	61.0	63.9	81.3	132.8	59.9
May	106.2	92.7	59.2	26.9	30.1	67.9	62.8	84.8	132.8	
June	104.5	87.4	50.8	22.8	36.7	70.8	58.3	86.2	112.6	
July	98.4	74.5	45.0	19.7	42.7	49.2	53.8	84.4	120.3	
August	104.1	72.3	42.9	19.8	53.4	45.2	63.2	89.5	129.8	
September	102.6	69.5	37.0	20.8	48.6	38.3	66.0	89.1	118.3	
October	100.3	69.5	34.8	23.4	48.7	40.2	67.9	92.9	108.5	
November	93.7	62.3	32.7	23.6	43.4	42.8	68.2	95.8	84.8	
December	87.0	60.5	33.6	22.8	44.2	47.7	73.9	105.3	68.9	

Source: Bureau of Labor Statistics, United States Department of Labor.
(Adjusted to 1929 = 100)

MARYLAND
INDEXES OF PAY ROLL
FOR
BLAST FURNACES, STEEL WORKS AND ROLLING MILLS,
BY MONTHS, FROM 1929 TO 1938

WITH 1929 = 100

Exhibit No. 11 Table (Continued)

MONTH	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
January	87.6	88.2	65.2	46.9	25.3	60.7	57.5	85.2	141.7	112.3
February	102.8	107.7	75.4	46.0	24.9	62.9	70.1	89.8	150.7	126.4
March	103.4	109.9	68.9	42.3	27.6	66.5	76.4	83.8	169.8	120.1
April	105.7	110.7	71.9	43.9	25.7	69.9	76.1	96.6	190.4	113.4
May	107.8	109.4	72.9	39.0	29.1	75.8	74.5	104.9	191.1	
June	102.2	99.8	68.7	30.2	38.0	85.6	74.3	110.8	191.8	
July	102.9	96.4	61.3	26.7	48.5	81.5	73.0	113.6	180.9	
August	98.7	89.7	70.3	24.8	62.5	53.9	78.4	118.8	183.7	
September	96.9	94.3	62.2	25.0	71.5	54.8	83.2	123.3	191.7	
October	99.6	88.8	55.3	29.7	59.9	43.7	75.8	126.8	180.9	
November	101.8	83.3	52.9	27.0	61.6	54.5	83.0	133.8	154.3	
December	90.5	67.4	50.9	26.8	59.3	49.3	85.1	133.3	122.5	

Source: Commissioner of Labor and Statistics - Baltimore, Maryland.
(Adjusted to 1929 = 100)

CHAPTER 7

PRICES OF IRON AND STEEL

CHAPTER 7

PRICES OF IRON AND STEEL

Pricing of iron and steel products has been dictated largely by the policies of a few of the largest producers and has been influenced also by the buying policies of some of the largest consumers.

Prior to June 1938 prices were quoted on basing systems established by the industry. Volumes have been written on investigations and criticisms of these basing systems and on proposed alternative systems.

Prior to the cease and desist order of the Federal Trade Commission in 1924, the Pittsburgh Plus System was in vogue. Under this system the delivered cost of steel products was the price at Pittsburgh plus freight from Pittsburgh to point of delivery. This system was an outgrowth of the high concentration of the industry in the Pittsburgh area.

As concentration of one of the largest consumers, the automobile industry, grew in the Lake Region there was a large expansion of the iron and steel industry adjacent to this consuming area and the Lake Ore Supplies. Plants located in this area had advantages of reduced transportation costs on ore and a considerable portion of their products. These advantages were partly offset by higher transportation costs on coal for the manufacture of coke.

Prior to discontinuance of the Pittsburgh Plus System of pricing some of the independent producers in the Lake Region had broken away from the system and had established Chicago as a basing point.

The Pittsburgh Plus System of pricing was replaced in 1924 by the Multiple Base System which established basing in a number of steel producing centers. This system was recommended and accepted in the N.R.A. Code operations

but was considerably criticized as retaining many of the objectionable features of the Pittsburgh Plus System.

In June 1938, the Carnegie Steel Company, a subsidiary of the United States Steel Corporation simultaneously announced reductions in the price of some sheet steel and other products and the same prices f.o.b. Pittsburgh, Chicago, and Birmingham. Other companies followed this move establishing what virtually amounts to an f.o.b. plant pricing system.

This created considerable confusion among both producers and users of steel products and its influence on different districts is difficult to determine at this time.

Exhibits 12 and 12A, and tabulations, pages 70 to 73 show the National production trend for all steel products 1926 to 1937 inclusive and the price trends over the same period for some of the predominant products.

The price curves show a certain degree of inflexibility in steel prices. In 1929, the year taken as a basis for comparison, production reached an all time peak without a material rise in the composite price of steel products from the three preceding years.

In 1932, the year of lowest production the composite price of steel products was little below that of 1929.

In general prices of products, for which there is a material increase in demand in boom periods, advance and prices of these products are reduced in dull times to stimulate buying. Influence of the N.R.A. Code on steel prices is shown by comparison of 1933 and 1934 prices.

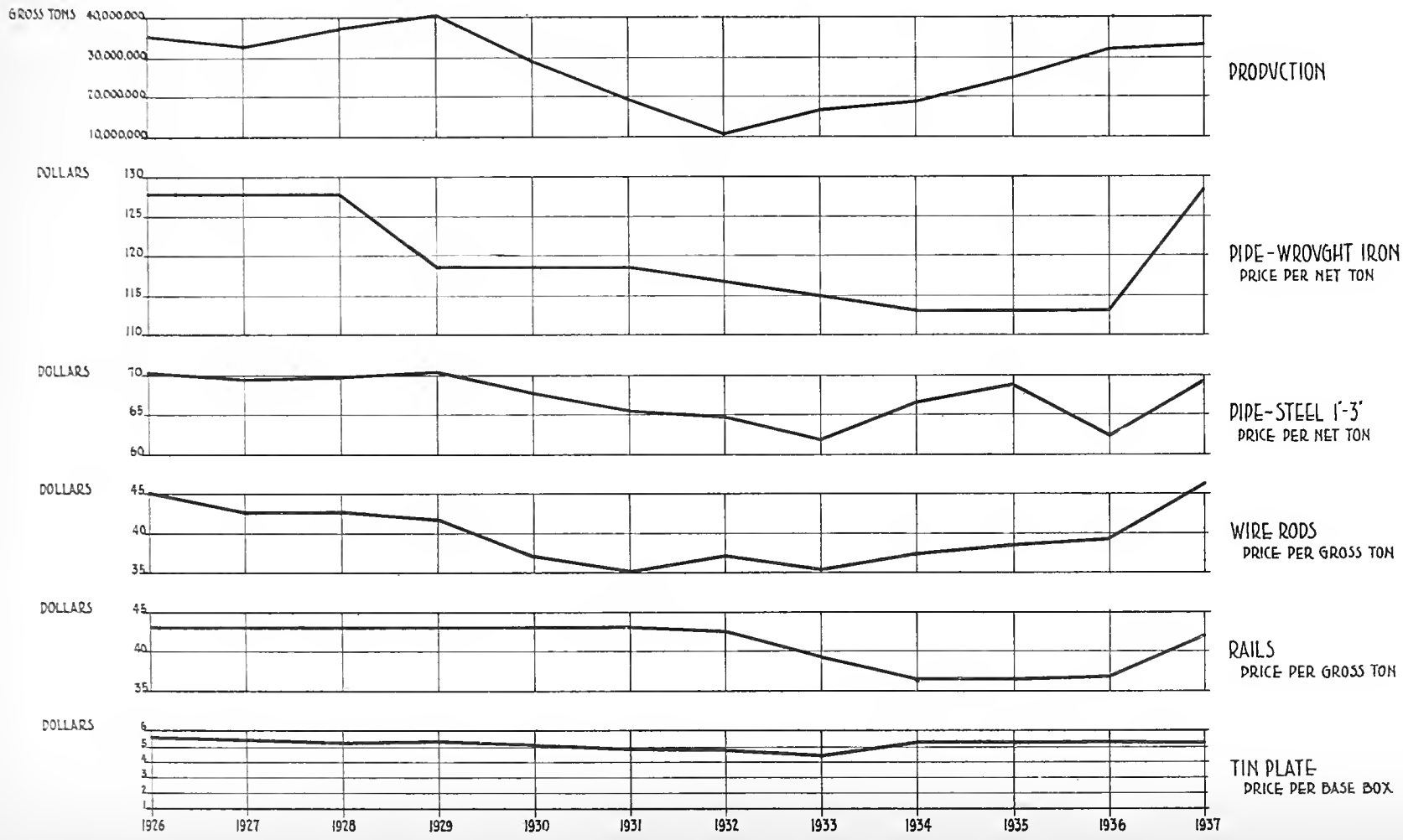
In recent years there has been a definite trend towards improved quality and reduction in price of a number of steel products, particularly sheets and other light steel products for which there has been a growing demand in miscellaneous new uses of steel.

EXHIBIT - 12

IRON AND STEEL INDUSTRY

BLAST FURNACES, STEEL WORKS AND ROLLING MILLS
TRENDS IN PRICES OF CERTAIN FINISHED STEEL PRODUCTS
FROM 1926 TO 1937 SHOWING PER CENT DEVIATION FROM 1929-100
AND PRODUCTION TREND FOR ALL STEEL PRODUCTS IN GROSS TONS OVER THE SAME PERIOD.

~ UNITED STATES ~



BLAST FURNACES, STEEL WORKS AND ROLLING MILLS.

TRENDS IN PRICES OF CERTAIN FINISHED STEEL PRODUCTS
FROM 1926 TO 1937, SHOWING PERCENT DEVIATION FROM 1929 = 100.
AVERAGE YEARLY PRICES AS AT PITTSBURG.

Exhibit No. 12 Table UNITED STATES

Year	Pipe Wrought Iron		Pipe Steel 1" - 3"		Wire Rods		Rails		Tin Plate	
	Dollars Per Net Ton	% 1929= 100	Dollars Per Net Ton	% 1929= 100	Dollars Per Gross Ton	% 1929= 100	Dollars Per Gross Ton	% 1929= 100	Dollars Per Base Box	% 1929= 100
1926	127.82	107.8	70.30	100.0	45.00	108.4	43.00	100.0	5.50	102.8
1927	127.82	107.8	69.57	99.0	42.44	102.3	43.00	100.0	5.48	102.4
1928	127.82	107.8	69.84	99.3	42.55	102.5	43.00	100.0	5.25	98.1
1929	118.56	100.0	70.30	100.0	41.50	100.0	43.00	100.0	5.35	100.0
1930	118.56	100.0	67.45	95.9	36.91	88.9	43.00	100.0	5.19	97.0
1931	118.56	100.0	65.29	92.9	35.03	84.4	43.00	100.0	4.94	92.3
1932	116.71	98.4	64.89	92.3	37.00	89.2	42.44	98.7	4.69	87.7
1933	114.90	96.9	61.63	87.7	35.15	84.7	39.26	91.3	4.43	82.8
1934	113.00	95.3	66.32	94.3	37.37	90.0	36.375	84.6	5.25	98.1
1935	113.00	95.3	68.40	97.3	38.21	92.1	36.375	84.6	5.25	98.1
1936	113.00	95.3	62.01	88.2	39.12	94.3	36.592	85.1	5.25	98.1
1937	128.06	108.0	69.17	98.4	46.27	111.5	41.86	97.3	5.22	97.6

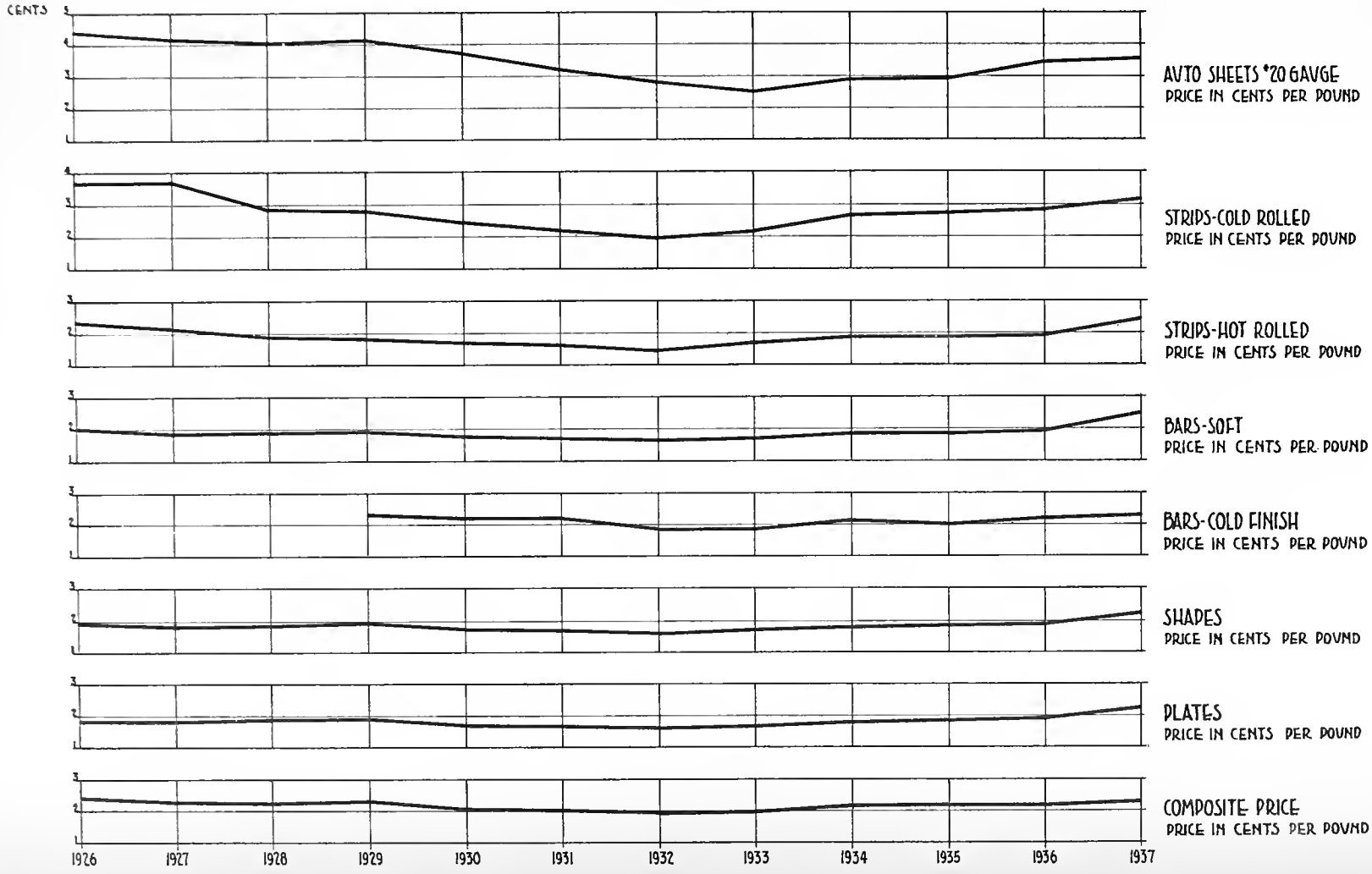
Source: IRON AGE

EXHIBIT-12A

IRON AND STEEL INDUSTRY

BLAST FURNACES STEEL WORKS AND ROLLING MILLS
TRENDS IN PRICES OF CERTAIN FINISHED STEEL PRODUCTS
FROM 1926 TO 1937 SHOWING PER CENT DEVIATION FROM 1929-100
AND PRODUCTION TREND FOR ALL STEEL PRODUCTS IN GROSS TONS OVER THE SAME PERIOD.

~ UNITED STATES ~



TRENDS IN PRICES OF CERTAIN FINISHED STEEL PRODUCTS
FROM 1926 TO 1937, SHOWING PERCENT DEVIATION FROM 1929 = 100.
AVERAGE YEARLY PRICES AS AT PITTSBURG.

Exhibit No. 12A Table

UNITED STATES

Year	Automobile Sheets #20 Gauge		Strips Cold Rolled		Strips Hot Rolled		Bars Soft Steel		Bars Cold Finished		Shapes		Plates		Composite* Price of Finished Steel	
	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100	Cents Per Pound	% 1929= 100
1926	4.30	105.9	3.60	130.0	2.30	122.3	2.00	104.2	#		1.95	101.6	1.88	97.4	2.409	104.9
1927	4.17	102.7	3.05	110.1	2.26	120.2	1.84	95.8	#		1.83	95.3	1.82	94.3	2.286	99.5
1928	4.03	99.3	2.92	105.4	1.93	102.7	1.87	97.4	#		1.87	97.4	1.87	96.9	2.254	98.1
1929	4.06	100.0	2.77	100.0	1.88	100.0	1.92	100.0	2.28	100.0	1.92	100.0	1.93	100.0	2.297	100.0
1930	3.64	89.7	2.46	88.8	1.68	89.4	1.71	89.1	2.09	91.7	1.69	88.0	1.69	87.6	2.111	91.9
1931	3.13	77.1	2.16	78.0	1.54	81.9	1.63	84.9	2.09	91.7	1.62	84.4	1.62	83.9	2.016	87.8
1932	2.80	69.0	1.97	71.1	1.43	76.1	1.57	81.8	1.81	79.4	1.57	81.8	1.57	81.3	1.957	85.2
1933	2.48	61.1	2.09	75.5	1.58	84.0	1.64	85.4	1.80	78.9	1.68	87.5	1.61	83.4	1.943	84.6
1934	2.96	72.9	2.58	93.1	1.85	98.4	1.81	94.3	2.10	92.1	1.78	92.7	1.78	92.2	2.103	91.6
1935	2.95	72.7	2.60	93.9	1.85	98.4	1.81	94.3	1.99	87.3	1.80	93.8	1.80	93.3	2.126	92.6
1936	3.02	74.4	2.62	94.6	1.91	101.6	1.93	100.5	2.20	96.5	1.85	96.4	1.85	95.9	2.148	93.5
1937	3.49	86.0	3.14	113.4	2.35	125.0	2.40	125.0	2.84	124.6	2.21	115.1	2.21	114.5	2.555	111.2

*Composite price: Steel Bars, Shapes, Plates, Plain Wire, Open Hearth Rails, Black Pipe, Black Sheets, and Hot Rolled Strips.

Data not available.

Source: IRON AGE

CHAPTER 8

COMPETITION

CHAPTER 8

COMPETITION

The competition between steel producing companies is primarily determined by:-

1. The cost of producing their products as compared to competitors cost.
2. The cost of distributing their products, particularly transportation from point of manufacture to consumer as compared to competitors cost.
3. Consumer preference and demand.

Item 1. Item one is influenced by a number of factors, chief of which are:-

a. Dependable long range supplies of raw materials such as iron ores, coal for making coke, used as reducing and heating fuel and in power generation and fluxes, at costs comparing favorably with competitors costs. High iron content and low silica and phosphorus content of iron ores, and low ash and sulphur content and good coking properties of coal used for making coke for reducing fuel, contribute to more efficient operation of blast furnaces and steel furnaces producing pig iron and steel ingots.

b. Dependable labor supply at favorable wage rates.

c. Rate of Operation:

Iron and steel producing units are large tonnage units, inflexible and not adapted to efficient

production at low rates of operation. Labor and other items of operating cost are practically constant irrespective of tonnage output. Production costs per ton rise rapidly with any considerable reduction in output.

d. Efficiency of Operation:

The efficiency of operation is influenced by the quality of raw materials, rate of operation, balancing of operations between the successive stages of processing, skill of the operating force and the types of installed equipment.

Rapid changes in recent years, particularly in steel rolling equipment, have made many of the older mills obsolete with respect to efficiency in rolling costs.

e. Fixed and Overhead Costs:

It is a requisite of any industrial operation that it make a reasonable return on capital investment if it expects to attract capital and continue in existence.

The capital investment of the fully integrated iron and steel companies is extremely large due to their large holdings of raw material supplies, transportation facilities and large manufacturing facilities on which enormous sums are expended to keep them modernized.

> These facilities result in lower manufacturing costs for large fully integrated producers than for the partly or non-integrated producers but when fixed and overhead charges are added the large integrated companies lose some of their manufacturing advantages. This enables the partly and non-integrated producers to compete with fully integrated producers and at times to show a better net return on investment.

Our study indicates that Maryland's steel industry is in a favorable position with respect to the foregoing items influencing cost of production.

Item 2. A large proportion of the products of the iron and steel industry are heavy tonnage products and transportation from the point of manufacture to the consumer represents a considerable part of the cost to the consumer. This has increased with increased freight rates and is unlikely, considering the railroad situation, to be reduced.

Increased cost of rail transportation has added to the advantage of steel plants located where water transportation can be used on a considerable portion of their tonnage to be distributed.

Maryland's chief iron and steel producing unit, the Sparrows Point plant of the Bethlehem Steel Corporation is located on tidewater and particularly well situated for a considerable distribution of its products to large steel consuming centers along the Atlantic Seaboard.

Fundamentally the location of an iron and steel producing center with reference to markets for its products, and the location of competitive producing centers with respect to such markets would determine to a large extent the industry's competitive position with respect to distribution of

its products.

This determination has not been so simple in the past however, due to sales and distribution practices involving pricing of products f.o.b. basing point or points, absorption of freight, additions and deductions of extras and other practices which made it difficult to definitely determine the true competition of a plant. Under these practices some products were probably sold below cost at times in some areas to maintain or boost plant operations and reduce costs on products shipped into more favorable market territory.

On June 24, 1958, the Carnegie Steel Company, a United States Steel Corporation subsidiary, simultaneously announced reductions in prices on some of its products and quoted the same prices f.o.b. Pittsburgh, Chicago, and Birmingham. Other producers followed the Steel Corporation's action making most mills base pricing points for products.

This action has been hailed, by steel industry journals, as a move to f.o.b. plant pricing but they comment on the confusion it created among producers and consumers. It has not been in effect long enough to determine its effect on Maryland's steel industry.

Item 3. Consumer Preference is probably not as vital a factor in the iron and steel industry as in more specialized products industries, the products of which move more directly to the ultimate consumer. With the development of special steels for various uses, in recent years however, it has become a more important factor than in former years. The steel producers, responding to consumers requirements, have developed steels for ordinary and special uses with a wide variety of chemical and physical properties. These have been developed through special processing and the use of alloying metals.

Relative price and quality, confidence in the producers products, delivery and credit terms largely influence the consumers buying policies.

Production Cost at Sparrows Point

With respect to the Bethlehem Steel Corporation plant at Sparrows Point, Maryland, the costs of iron and steel production are not published but it may be surmised, from their position with respect to raw material supplies, labor conditions, their up-to-date modern rolling equipment for rolling their predominant products, the kind of products made and their better than national average operating rate in recent years, that this plant is in position to produce its products at lower cost than northern and midwestern plants.

The United States Steel Corporation mills in Alabama, in which there has been carried out a large modernization of steel rolling facilities in the past five years and in which there exists a combination of iron ores, coal and fluxes, in close proximity, and cheap labor, is probably the lowest cost producing steel center.

The following table, showing the average value, per gross ton, of pig iron at blast furnaces in the United States in 1932 and 1933, groups Maryland with nine other States in most of which costs of producing pig iron higher than those in Maryland may be expected, Maryland's cost was probably between the "Other States" figures and "Alabama" figures.

Pig iron prices vary in different sections depending upon quality, cost of production and competition.

AVERAGE VALUE PER GROSS TON OF PIG IRON AT BLAST FURNACES IN THE UNITED STATES, 1932-1933

STATE	1932	1933
Alabama	$11.01	$11.55
Illinois	15.77	15.80
Indiana	15.45	15.42
Michigan	15.22	15.19
New York	14.38	14.50
Ohio	15.12	14.56
Pennsylvania	15.83	15.89
Tennessee	(a)	(a)
Other States b/	13.40	14.00
Average for United States	$14.80	$14.86

a/ Included under "Other States."
b/ Colorado, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Tennessee, Utah, Virginia, and West Virginia.

Source: Engineering and Mining Journal - Vol. 136, No. 9

Products Distribution

No definite figures on distribution costs of Maryland's iron and steel products were obtainable, it was however, possible to obtain and show the location of other steel producing centers, all of which are potential competitors of Maryland's steel industry. It was also possible to determine the predominant potential markets.

National Distribution of the Iron and Steel Industry and Predominant Consumer Markets

Maryland's steel ingot capacity according to the 1935 Iron and Steel Institute Directory is 2,450,000 gross tons per year. The national capacity

is 71,431,089 gross tons per year. Maryland, ranking sixth in capacity has 3.5 percent of the total national capacity.

The following table shows the national distribution of steel ingot production capacity by states in the order of their predominance.

National Distribution of Capacity
for the
Production of Steel Ingots

State	Annual Capacity Gross Tons	Percent of total	Cumulative Percent
Pennsylvania	25,421,004	32.8	32.8
Ohio	15,772,800	22.1	54.9
Indiana	8,496,200	11.9	66.8
Illinois	7,557,800	10.5	77.1
New York	3,244,700	4.5	81.6
Maryland	2,490,000	3.5	85.1
Alabama	2,212,500	3.1	88.2
Michigan	2,111,475	3.0	91.2
West Virginia	1,652,000	2.3	93.5
Kentucky	913,400	1.3	94.8
Colorado	888,000	1.2	96.0
California	680,000	0.9	96.9
Missouri	495,400	0.7	97.6
Delaware	378,000	0.5	98.1
Minnesota	300,000	0.4	98.5
New Jersey	279,670	0.4	98.9
Massachusetts	190,000	0.3	99.2
Washington	156,800	0.2	99.4
Connecticut	144,800	0.2	99.6
Georgia	137,040	0.2	99.8
Rhode Island	51,000)		
Oklahoma	50,000)	0.2	100.0
Texas	6,000)		
Virginia	2,500)		
Total	71,431,089	100.0	

Steel ingots, being the base semi-finished product from which rolled steel products are made, is an indicator of the national distribution of the iron and steel industry. Non-integrated steel plants, using semi-processed materials from integrated plants are mostly located near integrated plants from which their materials come.

The cumulative percent column of the table shows the high concentration of the industry in the four leading states, Pennsylvania, Ohio, Indiana and Illinois these having 77.1 percent of the total national ingot producing capacity. This concentration is due primarily to raw material supplies, lake region iron ores and good coking coals, adjacent to or within economic haulage distance of the operations and secondarily to concentration of the automotive, machinery manufacturing and other large steel consuming industries in the area of these states.

The national distribution of the Blast Furnace, Steel Works, and Rolling Mill Industry is shown in Exhibit 13 (map) page 84 and Exhibit 13A (tabulation) page 85.

The national distribution of components of the industry is shown in Exhibits 14 to 22 inclusive on pages 86 to 94.

These exhibits show the locations of the iron and steel producing operations which are potential competitors of Maryland's production. Maryland's steel products are in competition not only with products of other districts but also with some products of other plants of the Bethlehem Steel Corporation, parent company of the Sparrows Point plant.

Reference to Exhibit 6, page 42, chart and table, shows that the specific predominant industries, which collectively accounted for about seventy percent of the national consumption of iron and steel products during the years 1929 to 1936 inclusive, were automotive, building, railroad, metal container, oil, gas and mining, agriculture, machinery, highway construction and exports.

A study of national distribution of these predominant steel consuming industries shows that the automotive industry is highly concentrated in areas situated in Michigan, Wisconsin, Ohio, Illinois, New York, Indiana, Missouri,

and Kansas, at some distance from Baltimore and closer to other steel producing centers. The greatest concentration is in southern Michigan, southern Wisconsin, northern Illinois and northern Ohio areas.

The building industry is widely distributed with a high concentration area in the thickly populated Atlantic Seaboard area north of Maryland and within favorable shipping distance of Baltimore by rail and water transportation.

The railroads serving the densely populated area north of Maryland along the Atlantic Seaboard are large consumers of iron and steel in track equipment and rolling stock. The Maryland iron and steel industry is favorably located for supplying this demand.

The metal container industry has a large concentration also in the dersely populated Atlantic Seaboard area north of Maryland and comprises a favorable market for Maryland's production of tin and terne plate and black sheets for tinning, supplementing a considerable local market.

The oil, gas and mining industry is mostly concentrated, except for coal in sections at a considerable distance from Maryland and nearer to other iron and steel producing States.

Agricultural demand for iron and steel products, other than agricultural machinery is widely distributed. Maryland's iron and steel industry is favorably located for supplying this demand in the southeast, northern and middle Atlantic agricultural sections.

The highly industrial character of the Atlantic Seaboard area north of Maryland provides a large outlet for machinery which presents a considerable market for Maryland steel products favorably located with respect to shipping by rail and water.

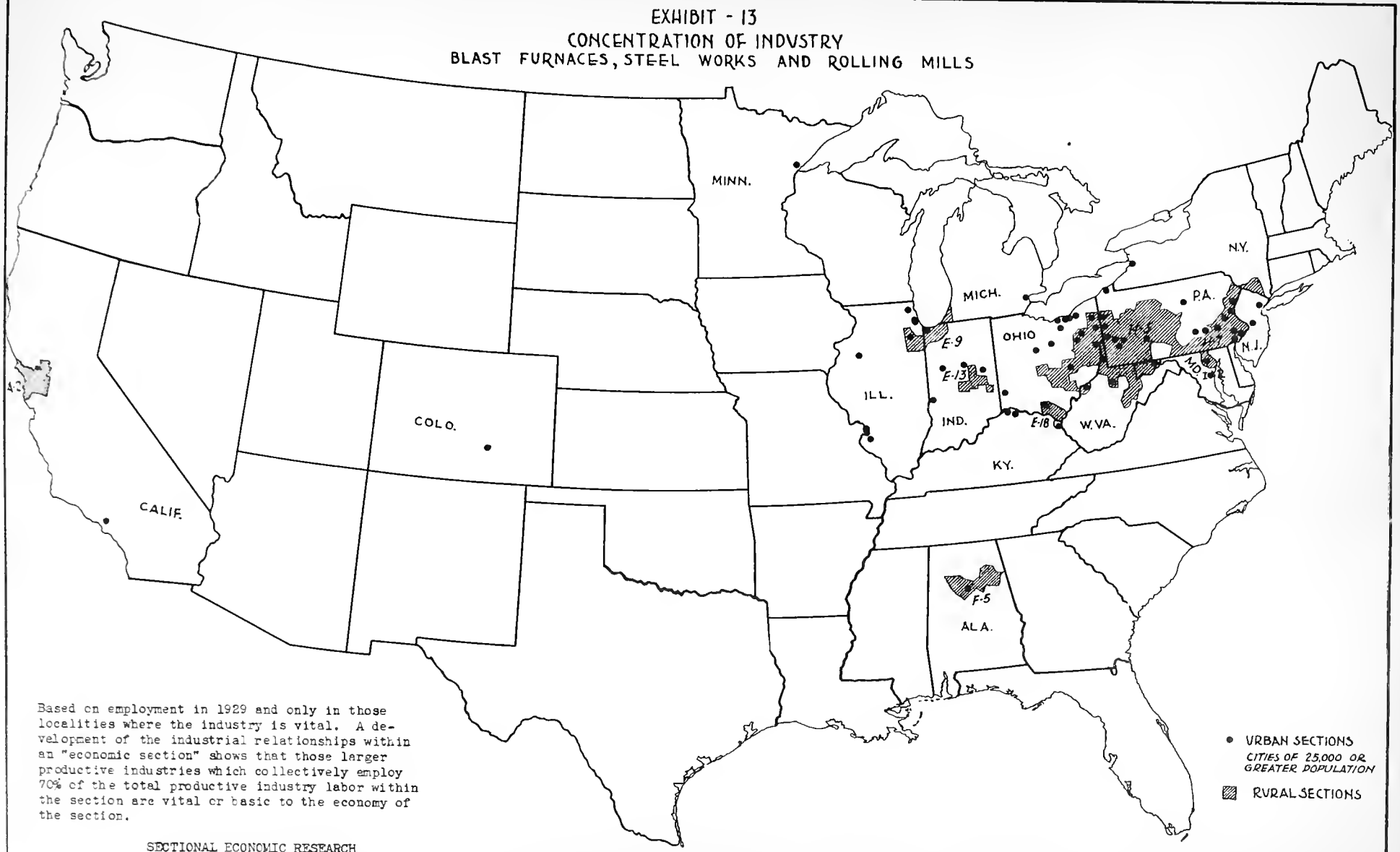
Mining operations is also a widely distributed consumer of steel products particularly in highly populated areas favorably located, with respect

to Maryland's steel industry.

Maryland's steel industry is most favorably located for export shipments of iron and steel products.

The growth in the miscellaneous new uses of steel including furniture, office fixtures, refriperators, air conditioning equipment and many other items of daily use will be greatest in the densely populated areas in the Atlantic Seaboard area north of Maryland and provides a fertile market for steel from Maryland.

EXHIBIT - 13
CONCENTRATION OF INDUSTRY
BLAST FURNACES, STEEL WORKS AND ROLLING MILLS



Based on employment in 1929 and only in those localities where the industry is vital. A development of the industrial relationships within an "economic section" shows that those larger productive industries which collectively employ 70% of the total productive industry labor within the section are vital or basic to the economy of the section.

SECTIONAL ECONOMIC RESEARCH
NATIONAL RESEARCH PROJECT
W. P. A.

- URBAN SECTIONS
  CITIES OF 25,000 OR GREATER POPULATION
- RURAL SECTIONS

BLAST FURNACES, STEEL WORKS, AND ROLLING MILLS

Industrial Sections in which the Blast Furnaces, Steel Works, and Rolling Mills Groups are one of the Vital Industrial Groups

		Employees in Blast Furnaces, Steel Wks. & Rolling Mills	% of Total Productive Employees			Employees in Blast Furnaces, Steel Wks. & Rolling Mills	% of Total Productive Employees
Alabama	Birmingham	7,648	18.4	Ohio	Elyria	1,300	22.0
Calif.	Alhambra	109	2.7		Lakewood	720	6.4
Colorado	Pueblo	3,751	51.4		Lorain	7,302	65.1
Illinois	Alton	664	9.6		Mansfield	1,339	18.1
	Chicago	30,814	4.7		Marion	472	9.3
	E. St. Louis	851	5.8		Massillon	3,059	51.5
	Evanston	491	6.8		Middletown	2,834	39.0
	Galesburg	153	4.3		Portsmouth	2,176	26.4
	Granite City	2,469	36.2		Steubenville	4,803	62.3
	Joilet	2,340	27.7		Warren	5,859	60.0
	Maywood	120	2.8		Youngstown	22,493	65.0
	Waukegan	1,193	15.4		Zanesville	929	12.8
Indiana	E. Chicago	9,692	58.5	Penna.	Aliquippa	6,946	89.6
	Gary	20,969	78.2		Allentown	1,518	7.0
	Hammond	1,886	13.3		Bethlehem	7,734	54.5
	Kokomo	1,442	20.1		Chester	1,970	12.6
	LaFayette	118	3.3		Easton	611	9.3
	Muncie	715	6.8		Erie	1,823	7.5
	Terre Haute	564	5.6		Harrisburg	1,999	18.6
Kentucky	Ashland	1,944	43.8		Johnstown	8,776	63.3
	Covington	611	5.6		Lebanon	2,108	31.6
	Newport	770	13.3		Lower Merion	122	3.8
Maryland	Baltimore	8,845	6.1		McKeesport	8,925	73.0
	Cumberland	454	6.9		New Castle	3,788	47.8
Michigan	Wyandotte	699	10.1		Norristown	641	10.3
Minnesota	Duluth	2,576	18.7		Pittsburgh	22,970	20.4
New Jersey	Belleville	306	5.8		Reading	3,000	9.9
	Trenton	3,411	13.8		Sharon	2,664	45.9
New York	Buffalo	7,637	7.2		Wilkinsburg	519	8.2
Ohio	Canton	6,613	28.9		Williamsport	264	2.8
	Cleveland	19,126	9.9	W. Va.	Clarksburg	430	9.3
	Cleve. Hts.	341	5.1		Parkersburg	357	7.1
					Wheeling	2,224	19.3
Rural Sections							
A - 2		3,244	6.6		F - 5	8,335	13.3
B - 9		4,367	11.0		H - 5	143,172	21.2
D - 13		1,792	6.8		H - 7	10,676	6.3
G - 18		3,286	28.0		I - 2	6,209	30.5

Source of Information:- U. S. Bureau of the Census, 1930

Sectional Economic Research, National Research Project - W.P.A. - Nov. 1936

EXHIBIT - 14

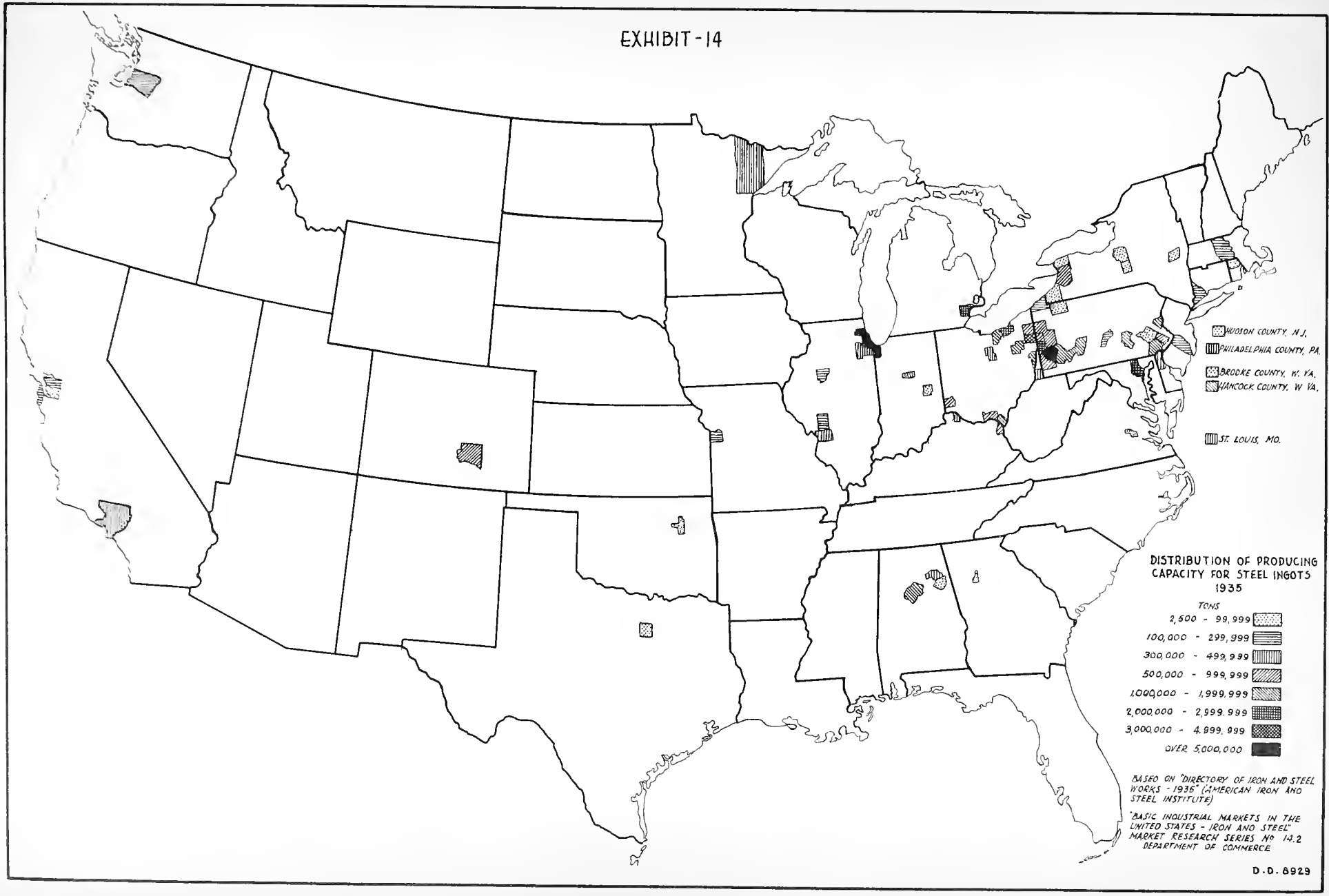

HUDSON COUNTY, N.J.
PHILADELPHIA COUNTY, PA.
BROOKE COUNTY, W. VA.
HANCOCK COUNTY, W VA.
ST. LOUIS, MO.
DISTRIBUTION OF PRODUCING CAPACITY FOR STEEL INGOTS 1935
TONS
2,500 - 99,999
100,000 - 299,999
300,000 - 499,999
500,000 - 999,999
1,000,000 - 1,999,999
2,000,000 - 2,999,999
3,000,000 - 4,999,999
OVER 5,000,000
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES - IRON AND STEEL" MARKET RESEARCH SERIES No 14.2 DEPARTMENT OF COMMERCE
D.D. 8929

EXHIBIT - 15

D. D. 8930

EXHIBIT - 16

KINGS COUNTY, N.Y.
PHILADELPHIA COUNTY, PA.
DISTRIBUTION OF PRODUCING CAPACITY FOR PIPE AND TUBES - 1935
TONS
0 - 99,999
100,000 - 199,999
200,000 - 299,999
300,000 - 399,999
400,000 - 599,999
600,000 - 799,999
800,000 - 999,999
OVER 1,000,000
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES IRON AND STEEL" MARKET RESEARCH SERIES NO 142 DEPARTMENT OF COMMERCE
D. D. 8931

EXHIBIT - 17

BROOKE COUNTY, W VA
HANCOCK COUNTY, W VA
OHIO COUNTY, W VA
DISTRIBUTION OF PRODUCING CAPACITY FOR SHEETS - 1935
TONS
0 - 49,999
50,000 - 99,999
100,000 - 149,999
150,000 - 199,999
200,000 - 299,999
300,000 - 399,999
400,000 - 499,999
500,000 AND OVER
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES - IRON AND STEEL" MARKET RESEARCH SERIES NO 14.2 DEPARTMENT OF COMMERCE
D.D. 8932

EXHIBIT-18

HUDSON COUNTY N.J.
PHILADELPHIA COUNTY, PA.
HANCOCK COUNTY, W. VA.
DISTRIBUTION OF PRODUCING CAPACITY FOR COLD ROLLED STRIP - 1935
TONS
0 - 24,999
25,000 - 49,999
50,000 - 74,999
75,000 - 99,999
100,000 - 149,999
150,000 - 199,999
200,000 - 299,999
300,000 AND OVER
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES - IRON AND STEEL" MARKET RESEARCH SERIES No 14.2 DEPARTMENT OF COMMERCE
D.D. 8933

EXHIBIT - 19

BROOKE COUNTY, W. VA.
HANCOCK COUNTY, W. VA.
DISTRIBUTION OF PRODUCING CAPACITY FOR TIN AND TERNE PLATE - 1935
TONS
0 - 24,999
25,000 - 49,999
50,000 - 74,999
75,000 - 99,999
100,000 - 149,999
150,000 - 199,999
200,000 - 299,999
300,000 AND OVER
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES - IRON AND STEEL" MARKET RESEARCH SERIES No. 14.2 DEPARTMENT OF COMMERCE
D.D. 8934

EXHIBIT-20

HUDSON COUNTY N.J.
DISTRIBUTION OF PRODUCING CAPACITY FOR COLD DRAWN BARS - 1935
TONS
0 - 24, 999
25,000 - 49, 999
50,000 - 74, 999
75,000 - 99, 999
100,000 - 149, 999
150,000 - 199, 999
200,000 - 299, 999
300,000 AND OVER
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES - IRON AND STEEL" MARKET RESEARCH SERIES No 14.2 DEPARTMENT OF COMMERCE
D. D. 8935

EXHIBIT-21

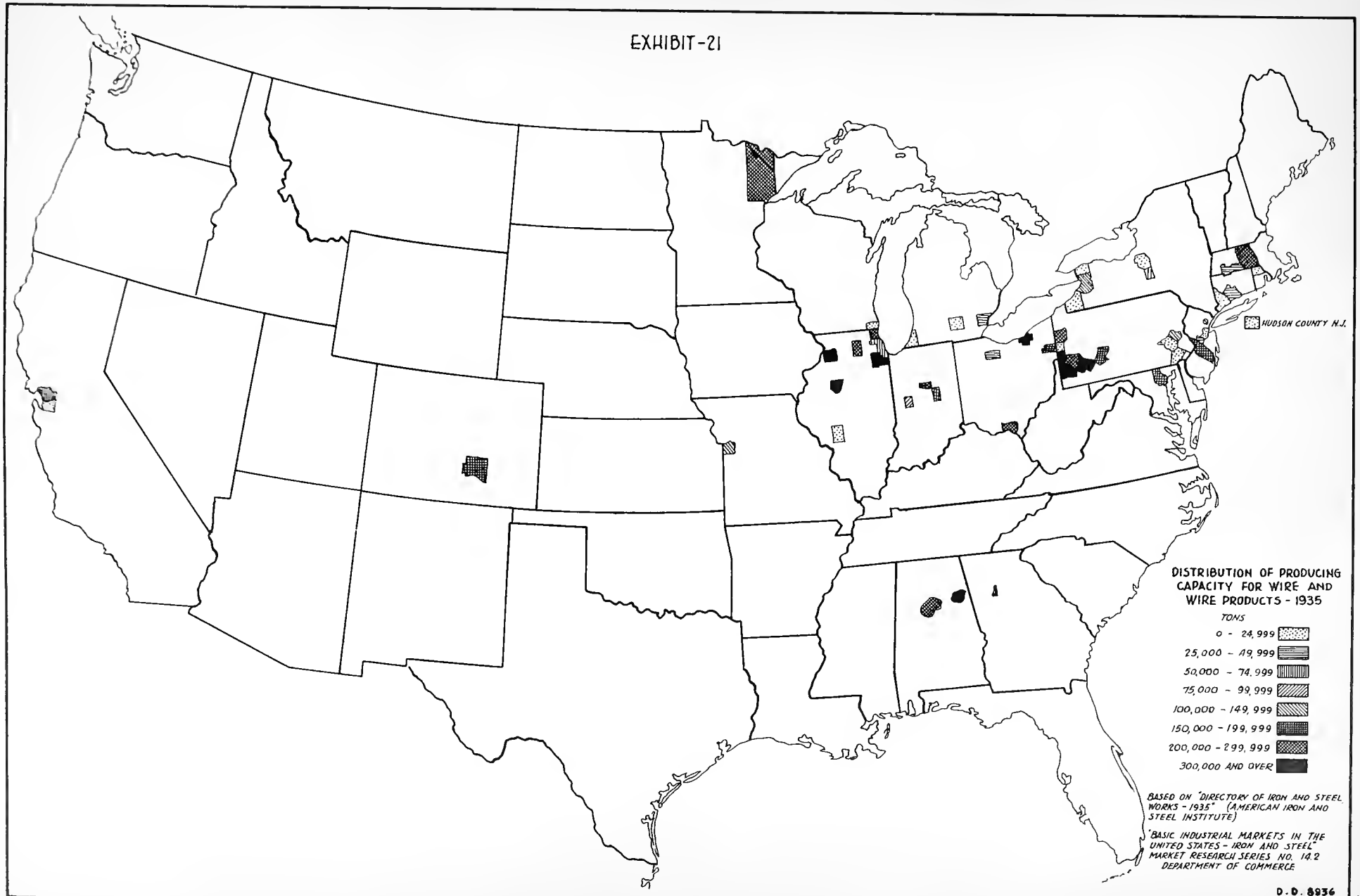
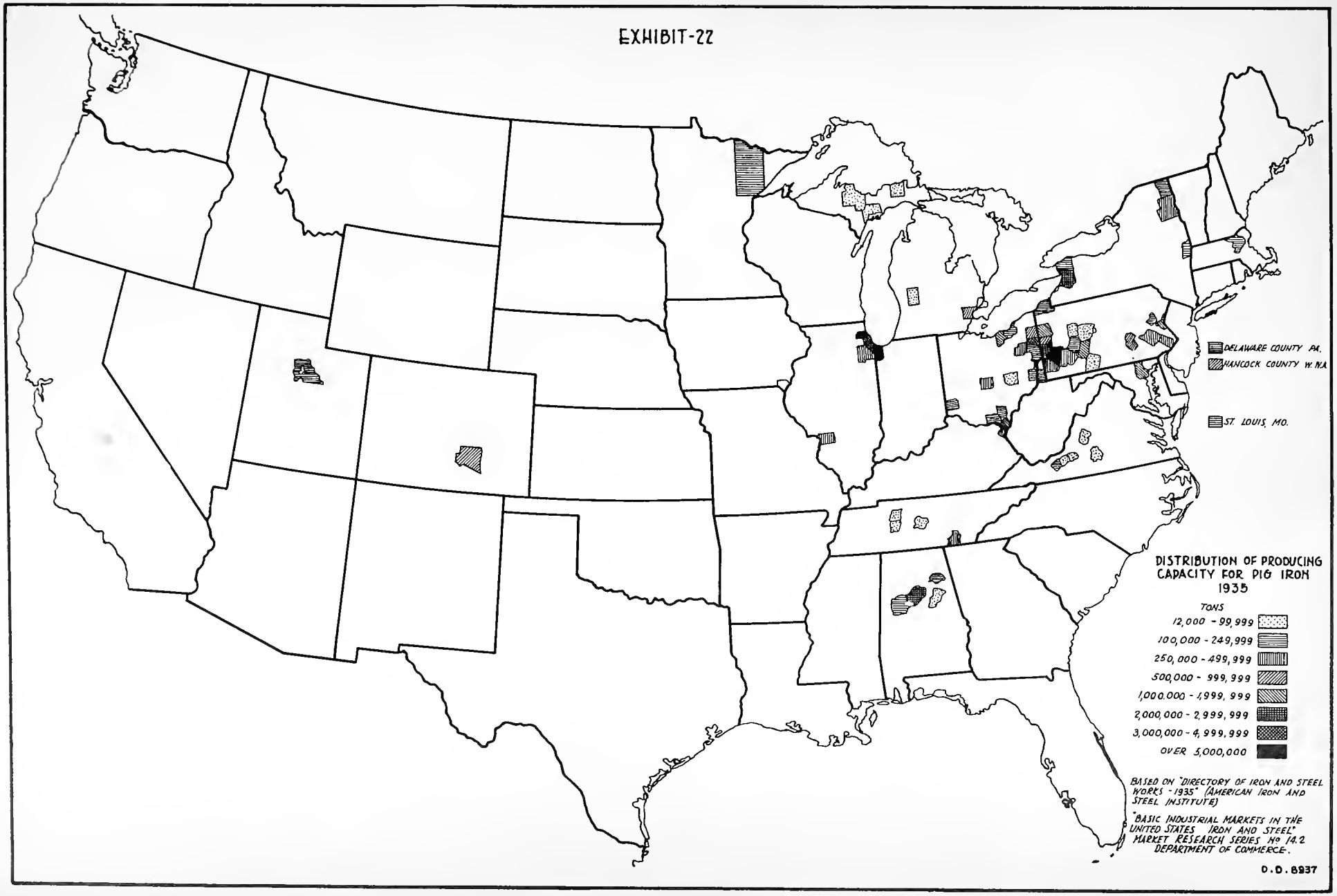

HUDSON COUNTY N.J.
DISTRIBUTION OF PRODUCING CAPACITY FOR WIRE AND WIRE PRODUCTS - 1935
TONS
0 - 24,999
25,000 - 49,999
50,000 - 74,999
75,000 - 99,999
100,000 - 149,999
150,000 - 199,999
200,000 - 299,999
300,000 AND OVER
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES - IRON AND STEEL" MARKET RESEARCH SERIES NO. 14.2 DEPARTMENT OF COMMERCE
D.D. 8936

EXHIBIT-22


DELAWARE COUNTY PA.
HANCOCK COUNTY W. VA.
ST. LOUIS, MO.
DISTRIBUTION OF PRODUCING CAPACITY FOR PIG IRON 1935
TONS
12,000 - 99,999
100,000 - 249,999
250,000 - 499,999
500,000 - 999,999
1,000,000 - 1,999,999
2,000,000 - 2,999,999
3,000,000 - 4,999,999
OVER 5,000,000
BASED ON "DIRECTORY OF IRON AND STEEL WORKS - 1935" (AMERICAN IRON AND STEEL INSTITUTE)
"BASIC INDUSTRIAL MARKETS IN THE UNITED STATES IRON AND STEEL" MARKET RESEARCH SERIES No 14.2 DEPARTMENT OF COMMERCE.
D.D. 8937

CHAPTER 9

TECHNOLOGY IN THE IRON AND STEEL INDUSTRY

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TECHNOLOGY IN THE IRON AND STEEL INDUSTRY

Technology in the iron and steel industry has been principally directed to improvement in the quality of products, development of new products and reduction in steel prices.

These are being accomplished through improved processing methods and the use of other metals alloyed with iron to give special chemical and physical properties and through the development of new and more efficient rolling equipment.

Increasing uses of steel and diversity of uses have created demands for a multitude of different types of steels of different specifications with respect to chemical composition and physical properties which adapt them to uses where resistance to corrosion or abrasion, strength combined with lightness, and adaptability to shaping and drawing, are demanded. High speed tool steels, corrosion resistant copper bearing steels, stainless steels, drawing steels for manufacture of automobile bodies and other parts, high strength lighter weight sheets and plates for various uses, and vanadium, chromium and molybdenum alloy steels are outstanding examples of special steel developments.

In the processing field there have been important developments in heat treating, carburizing, annealing, etc., to give special physical properties to steel and revolutionary developments in the rolling of steel aimed at reducing the number of processing stages and manual labor required and wastage in croppings returned for re-working.

These are all directed to improvement in quality and lower cost.

Ability to increase consumption and extend the uses of steel by replacement of other materials has largely depended on such accomplishments.

The outstanding developments in equipment in recent years are the radical improvements in rolling mills including high speed continuous mills and the continuous hot strip mill.

The hot strip mill is of such recent development that it is difficult to appraise its final influence on the industry but it may have a revolutionary effect on labor, cost of sheet steel products to consumer and competition between steel producers.

Daugherty, De Chezeau and Stratton in their work "Economics of The Iron and Steel Industry" give a description of a modern strip mill. Some items are cited from this description:-

The investment involved in a large hot strip mill and its accessory equipment is over $15,000,000. Such a mill has an annual capacity of about 600,000 gross tons of rolled products, can roll plates and sheets from one-half inch thickness down to twenty gauge thickness and up to seventy-two inches in width from slabs weighing up to seven and one-half tons.

The feed to a strip mill consists of preheated slabs which are converted into plates and sheets of specified size, thickness, width and finish in successive and continuous passage through a scale breaker, high pressure water spray for cleansing the steel, roughing mills, further scale breaking and removal and finishing rolls.

The rolling equipment of a typical strip mill comprises:-

> Three roughing mills in succession and six finishing mills. The steel starts, in a large preheated slab, into the first roughing mill and passes in succession through the other two roughing mills and six finishing mills, being further reduced in thickness in its continuous passage through each of these mills. A single strip of steel may be actually passing through the rollers of

of all six finishing mills at the same time, one end coming out of the last mill before the other end has passed through the first mill.

The six finishing mills are electrically driven, carefully synchronized and their speed timed to take care of the increased speed of travel of the steel as it is elongated in each successive rolling. The mills are electrically controlled by a switchboard from a control tower.

The long strip issuing from the last finishing mill is cut into sheets of desired length by flying shears.

In the recent modernization campaign of the Bethlehem Steel Corporation at the Sparrows Point plant one of these mills was installed and is now in operation.

An announcement of a recent bond issue by the United States Steel Corporation contained a reference to the installation of a hot strip mill and cold reduction sheet and tin plate mills near Clairton, Pennsylvania for the completion of which approximately $40,500,000 was to be used.

The same announcement stated that a large part of the modernization expenditures during the three years prior to December 31, 1937 were in connection with the erection of a large rolling mills in the corporation's Alabama operations.

With the combination of the lowest priced pig iron and modern steel rolling facilities, Alabama steel products are liable to assume more importance in competition with the steel operations of other districts.

The vast expenditures of the two leading producers, United States Steel Corporation and Bethlehem Steel Corporation for improvement and modernization

will probably tend to strengthen their domination of the iron and steel industry and seriously affect smaller producers not in financial position to make the large expenditures involved in such modernization. Many of these smaller producers are in the position of buying their raw materials from the larger integrated producers and being in competition with them on their finished products.

Fortunately Maryland's chief iron and steel industry is fully integrated and equipped with most modern equipment for the production of its predominant products and these products are among those for which the demand is more stable and is increasing.